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(54) Title: METHOD AND REAGENT FOR THE TREATMENT OF DISEASES OR CONDITIONS RELATED TO LEVELS OF VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR

(57) Abstract

Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.

Applicants: Jason Francis Conaty et al
U.S. Serial No.: 09/887,880
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DESCRIPTION

Method and Reagent for the Treatment of Diseases or Conditions Related to Levels of Vascular Endothelial Growth Factor Receptor

Background Of The Invention

This application is a continuation-in-part of Pavco et al., U.S. Serial No. 60/005,974 all of which is hereby incorporated by reference herein (including drawings).

This invention relates to methods and reagents for the treatment of diseases or conditions relating to the levels of expression of vascular endothelial growth factor (VEGF) receptor(s).

The following is a discussion of relevant art, none of which is admitted to be prior art to the present invention.

VEGF, also referred to as vascular permeability factor (VPF) and vasculotropin, is a potent and highly specific mitogen of vascular endothelial cells (for a review see Ferrara, 1993 *Trends Cardiovas. Med.* 3, 244; Neufeld *et al.*, 1994 *Prog. Growth Factor Res.* 5, 89). VEGF induced neovascularization is implicated in various pathological conditions such as tumor angiogenesis, proliferative diabetic retinopathy, hypoxia-induced angiogenesis, rheumatoid arthritis, psoriasis, wound healing and others.

VEGF, an endothelial cell-specific mitogen, is a 34-45 kDa glycoprotein with a wide range of activities that include promotion of angiogenesis, enhancement of vascular-permeability and others. VEGF belongs to the platelet-derived growth factor (PDGF) family of growth factors with approximately 18% homology with the A and B chain of PDGF at the amino acid level. Additionally, VEGF contains the eight conserved cysteine residues common to all growth factors belonging to the PDGF family (Neufeld *et al.*, *supra*). VEGF protein is believed to exist

predominantly as disulfide-linked homodimers; monomers of VEGF have been shown to be inactive (Plouet *et al.*, 1989 *EMBO J.* 8, 3801).

VEGF exerts its influence on vascular endothelial cells by binding to specific high-affinity cell surface receptors. Covalent cross-linking experiments with ^{125}I-labeled VEGF protein have led to the identification of three high molecular weight complexes of 225, 195 and 175 kDa presumed to be VEGF and VEGF receptor complexes (Vaisman *et al.*, 1990 *J. Biol. Chem.* 265, 19461). Based on these studies VEGF-specific receptors of 180, 150 and 130 kDa molecular mass were predicted. In endothelial cells, receptors of 150 and the 130 kDa have been identified. The VEGF receptors belong to the superfamily of receptor tyrosine kinases (RTKs) characterized by a conserved cytoplasmic catalytic kinase domain and a hydrophylic kinase sequence. The extracellular domains of the VEGF receptors consist of seven immunoglobulin-like domains that are thought to be involved in VEGF binding functions.

The two most abundant and high-affinity receptors of VEGF are flt-1 (*fms*-like tyrosine kinase) cloned by Shibuya *et al.*, 1990 *Oncogene* 5, 519 and KDR (kinase-insert-domain-containing receptor) cloned by Terman *et al.*, 1991 *Oncogene* 6, 1677. The murine homolog of KDR, cloned by Mathews *et al.*, 1991, *Proc. Natl. Acad. Sci.*, USA, 88, 9026, shares 85% amino acid homology with KDR and is termed as flk-1 (fetal liver kinase-1). Recently it has been shown that the high-affinity binding of VEGF to its receptors is modulated by cell surface-associated heparin and heparin-like molecules (Gitay-Goren *et al.*, 1992 *J. Biol. Chem.* 267, 6093).

VEGF expression has been associated with several pathological states such as tumor angiogenesis, several forms of blindness, rheumatoid arthritis, psoriasis and others. Following is a brief summary of evidence supporting the involvement of VEGF in various diseases:

1) Tumor angiogenesis: Increased levels of VEGF gene expression have been reported in vascularized and edema-associated brain tumors (Berkman *et al.*, 1993 *J. Clini. Invest*. 91, 153). A more direct demostration of the role of VEGF in tumor angiogenesis was demonstrated by Jim Kim *et al.*, 1993 *Nature* 362,841 wherein, monoclonal antibodies against VEGF were successfully used to inhibit the growth of rhabdomyosarcoma, glioblastoma multiforme cells in nude mice. Similarly, expression of a dominant negative mutated form of the flt-1 VEGF receptor inhibits vascularization induced by human glioblastoma cells in nude mice (Millauer *et al.*, 1994, *Nature* 367, 576).

2) Ocular diseses: Aiello *et al.*, 1994 *New Engl. J. Med*. 331, 1480, showed that the ocular fluid, of a majority of patients suffering from diabetic retinopathy and other retinal disorders, contains a high concentration of VEGF. Miller *et al.*, 1994 *Am. J. Pathol*. 145, 574, reported elevated levels of VEGF mRNA in patients suffering from retinal ischemia. These observations support a direct role for VEGF in ocular diseases.

3) Psoriasis: Detmar *et al.*, 1994 *J. Exp. Med*. 180, 1141 reported that VEGF and its receptors were over-expressed in psoriatic skin and psoriatic dermal micro-vessels, suggesting that VEGF plays a significant role in psoriasis.

4) Rheumatoid arthritis: Immunohistochemistry and *in situ* hybridization studies on tissues from the joints of patients suffering from rheumatoid arthritis show an increased level of VEGF and its receptors (Fava *et al.*, 1994 *J. Exp. Med*. 180, 341). Additionally, Koch *et al.*, 1994 *J. Immunol*. 152, 4149, found that VEGF-specific antibodies were able to significantly reduce the mitogenic activity of synovial tissues from patients suffering from rheumatoid arthritis. These observations support a direct role for VEGF in rheumatoid arthritis.

In addition to the above data on pathological conditions involving excessive angiogenesis, a number of

studies have demonstrated that VEGF is both necessary and sufficient for neovascularization. Takashita *et al.*, 1995 *J. Clin. Invest.* 93, 662, demonstrated that a single injection of VEGF augmented collateral vessel development in a rabbit model of ischemia. VEGF also can induce neovascularization when injected into the cornea. Expression of the VEGF gene in CHO cells is sufficient to confer tumorigenic potential to the cells. Kim *et al.*, *supra* and Millauer *et al.*, *supra* used monoclonal antibodies against VEGF or a dominant negative form of flk-1 receptor to inhibit tumor-induced neovascularization.

During development, VEGF and its receptors are associated with regions of new vascular growth (Millauer *et al.*, 1993 *Cell* 72, 835; Shalaby *et al.*, 1993 *J. Clin. Invest.* 91, 2235). Furthermore, transgenic mice lacking either of the VEGF receptors are defective in blood vessel formation, infact these mouse do not survive; flk-1 appears to be required for differentiation of endothelial cells, while flt-1 appears to be required at later stages of vessel formation (Shalaby *et al.*, 1995 *Nature* 376, 62; Fung *et al.*, 1995 *Nature* 376, 66). Thus, these receptors must be present to properly signal endothelial cells or their precursors to respond to vascularization-promoting stimuli.

All of the conditions listed above, involve extensive vascularization. This hyper-stimulation of endothelial cells may be alleviated by VEGF antagonists. Thus most of the therapeutic efforts for the above conditions have concentrated on finding inhibitors of the VEGF protein.

Kim *et al.*, 1993 *Nature* 362, 841 have been successful in inhibiting VEGF-induced tumor growth and angiogenesis in nude mice by treating the mice with VEGF-specific monoclonal antibody.

Koch *et al.*, 1994 *J. Immunol.* 152, 4149 showed that the mitogenic activity of microvascular endothelial cells found in rheumatoid arthritis (RA) synovial tissue explants and the chemotactic property of endothelial cells

from RA synovial fluid can be neutralized significantly by treatment with VEGF-specific antibodies.

Ullrich *et al.*, International PCT Publication No. WO 94/11499 and Millauer *et al.*, 1994 *Nature* 367, 576 used a soluble form of flk-1 receptor (dominant-negative mutant) to prevent VEGF-mediated tumor angiogenesis in immunodeficient mice.

Kendall and Thomas, International PCT Publication No. WO 94/21679 describe the use of naturally occuring or recombinantly-engineered soluble forms of VEGF receptors to inhibit VEGF activity.

Robinson, International PCT Publication No. WO 95/04142 describes the use of antisense oligonucleotides targeted against VEGF RNA to inhibit VEGF expression.

Jellinek *et al.*, 1994 *Biochemistry* 33, 10450 describe the use of VEGF-specific high-affinity RNA aptamers to inhibit the binding of VEGF to its receptors.

Rockwell and Goldstein, International PCT Publication No. WO 95/21868, describe the use of anti-VEGF receptor monoclonal antibodies to neutralize the the effect of VEGF on endothelial cells.

Summary Of The Invention

The invention features novel nucleic acid-based techniques [e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups (Cook *et al.*, U.S. Patent 5,359,051)] and methods for their use to down regulate or inhibit the expression of receptors of VEGF (VEGF-R).

In a preferred embodiment, the invention features use of one or more of the nucleic acid-based techniques to inhibit the expression of flt-1 and/or flk-1/KDR receptors.

By "inhibit" it is meant that the activity of VEGF-R or level of mRNAs or equivalent RNAs encoding VEGF-R is reduced below that observed in the absence of the nucleic acid. In one embodiment, inhibition with ribozymes

preferably is below that level observed in the presence of an enzymatically inactive RNA molecule that is able to bind to the same site on the mRNA, but is unable to cleave that RNA. In another embodiment, inhibition with antisense oligonucleotides is preferably below that level observed in the presence of for example, an oligonucleotide with scrambled sequence or with mismatches.

By "enzymatic nucleic acid molecule" it is meant an RNA molecule which has complementarity in a substrate binding region to a specified gene target, and also has an enzymatic activity which is active to specifically cleave target RNA. That is, the enzymatic RNA molecule is able to intermolecularly cleave RNA and thereby inactivate a target RNA molecule. This complementary regions allow sufficient hybridization of the enzymatic RNA molecule to the target RNA and thus permit cleavage. One hundred percent complementarity is preferred, but complementarity as low as 50-75% may also be useful in this invention. By "equivalent" RNA to VEGF-R is meant to include those naturally occurring RNA molecules in various animals, including human, mice, rats, rabbits, primates and pigs.

By "antisense nucleic acid" it is meant a non-enzymatic nucleic acid molecule that binds to target RNA by means of RNA-RNA or RNA-DNA or RNA-PNA (protein nucleic acid; Egholm *et al.*, 1993 *Nature* 365, 566) interactions and alters the activity of the target RNA (for a review see Stein and Cheng, 1993 *Science* 261, 1004).

By "2-5A antisense chimera" it is meant, an antisense oligonucleotide containing a 5' phosphorylated 2'-5'-linked adenylate residues. These chimeras bind to target RNA in a sequence-specific manner and activate a cellular 2-5A-dependent ribonuclease which, in turn, cleaves the target RNA (Torrence *et al.*, 1993 *Proc. Natl. Acad. Sci. USA* 90, 1300).

By "triplex DNA" it is meant an oligonucleotide that can bind to a double-stranded DNA in a sequence-specific manner to form a triple-strand helix. Formation of such

triple helix structure has been shown to inhibit transcription of the targeted gene (Duval-Valentin *et al.*, 1992 *Proc. Natl. Acad. Sci.USA* 89, 504).

By "gene" it is meant a nucleic acid that encodes an RNA.

By "complementarity" it is meant a nucleic acid that can form hydrogen bond(s) with other RNA sequence by either traditional Watson-Crick or other non-traditional types (for example, Hoogsteen type) of base-paired interactions.

Six basic varieties of naturally-occurring enzymatic RNAs are known presently. Each can catalyze the hydrolysis of RNA phosphodiester bonds in *trans* (and thus can cleave other RNA molecules) under physiological conditions. Table I summarizes some of the characteristics of these ribozymes. In general, enzymatic nucleic acids act by first binding to a target RNA. Such binding occurs through the target binding portion of a enzymatic nucleic acid which is held in close proximity to an enzymatic portion of the molecule that acts to cleave the target RNA. Thus, the enzymatic nucleic acid first recognizes and then binds a target RNA through complementary base-pairing, and once bound to the correct site, acts enzymatically to cut the target RNA. Strategic cleavage of such a target RNA will destroy its ability to direct synthesis of an encoded protein. After an enzymatic nucleic acid has bound and cleaved its RNA target, it is released from that RNA to search for another target and can repeatedly bind and cleave new targets. Thus, a single ribozyme molecule is able to cleave many molecules of target RNA. In addition, the ribozyme is a highly specific inhibitor of gene expression, with the specificity of inhibition depending not only on the base-pairing mechanism of binding to the target RNA, but also on the mechanism of target RNA cleavage. Single mismatches, or base-substitutions, near the site of cleavage can completely eliminate catalytic activity of a ribozyme.

Ribozymes that cleave the specified sites in VEGF-R mRNAs represent a novel therapeutic approach to treat tumor angiogenesis, ocular diseases, rhuematoid arthritis, psoriasis and others. Applicant indicates that ribozymes are able to inhibit the activity of VEGF-R (specifically flt-1 and flk-1/KDR) and that the catalytic activity of the ribozymes is required for their inhibitory effect. Those of ordinary skill in the art will find that it is clear from the examples described that other ribozymes that cleave VEGF-R mRNAs may be readily designed and are within the invention.

In preferred embodiments of this invention, the enzymatic nucleic acid molecule is formed in a hammerhead or hairpin motif, but may also be formed in the motif of a hepatitis delta virus, group I intron or RNaseP RNA (in association with an RNA guide sequence) or *Neurospora* VS RNA. Examples of such hammerhead motifs are described by Rossi *et al.*, 1992, *AIDS Research and Human Retroviruses* 8, 183, of hairpin motifs by Hampel *et al.*, EP0360257, Hampel and Tritz, 1989 *Biochemistry* 28, 4929, and Hampel *et al.*, 1990 *Nucleic Acids Res.* 18, 299, and an example of the hepatitis delta virus motif is described by Perrotta and Been, 1992 *Biochemistry* 31, 16; of the RNaseP motif by Guerrier-Takada *et al.*, 1983 *Cell* 35, 849, *Neurospora* VS RNA ribozyme motif is described by Collins (Saville and Collins, 1990 *Cell* 61, 685-696; Saville and Collins, 1991 *Proc. Natl. Acad. Sci. USA* 88, 8826-8830; Collins and Olive, 1993 *Biochemistry* 32, 2795-2799) and of the Group I intron by Cech *et al.*, U.S. Patent 4,987,071. These specific motifs are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific substrate binding site which is complementary to one or more of the target gene RNA regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart an RNA cleaving activity to the molecule.

In a preferred embodiment the invention provides a method for producing a class of enzymatic cleaving agents which exhibit a high degree of specificity for the RNA of a desired target. The enzymatic nucleic acid molecule is preferably targeted to a highly conserved sequence region of target mRNAs encoding VEGF-R proteins (specifically flt-1 and flk-1/KDR) such that specific treatment of a disease or condition can be provided with either one or several enzymatic nucleic acids. Such enzymatic nucleic acid molecules can be delivered exogenously to specific tissue or cellular targets as required. Alternatively, the ribozymes can be expressed from DNA and/or RNA vectors that are delivered to specific cells.

Synthesis of nucleic acids greater than 100 nucleotides in length is difficult using automated methods, and the therapeutic cost of such molecules is prohibitive. In this invention, small nucleic acid motifs (*e.g.*, antisense oligonucleotides, hammerhead or the hairpin ribozymes) are used for exogenous delivery. The simple structure of these molecules increases the ability of the nucleic acid to invade targeted regions of the mRNA structure. However, these nucleic acid molecules can also be expressed within cells from eukaryotic promoters (*e.g.*, Izant and Weintraub, 1985 *Science* 229, 345; McGarry and Lindquist, 1986 *Proc. Natl. Acad. Sci.* USA 83, 399; Sullenger-Scanlon *et al.*, 1991, *Proc. Natl. Acad. Sci. USA*, 88, 10591-5; Kashani-Sabet *et al.*, 1992 *Antisense Res. Dev.*, 2, 3-15; Dropulic *et al.*, 1992 *J. Virol*, 66, 1432-41; Weerasinghe *et al.*, 1991 *J. Virol*, 65, 5531-4; Ojwang *et al.*, 1992 *Proc. Natl. Acad. Sci. USA* 89, 10802-6; Chen *et al.*, 1992 *Nucleic Acids Res.*, 20, 4581-9; Sarver *et al.*, 1990 *Science* 247, 1222-1225; Thompson *et al.*, 1995 *Nucleic Acids Res.* 23, 2259). Those skilled in the art realize that any nucleic acid can be expressed in eukaryotic cells from the appropriate DNA/RNA vector. The activity of such nucleic acids can be augmented by their release from the primary transcript by a ribozyme (Draper

et al., PCT WO93/23569, and Sullivan *et al.*, PCT WO94/02595, both hereby incorporated in their totality by reference herein; Ohkawa *et al.*, 1992 Nucleic Acids Symp. Ser., 27, 15-6; Taira *et al.*, 1991, Nucleic Acids Res., 19, 5125-30; Ventura *et al.*, 1993 Nucleic Acids Res., 21, 3249-55; Chowrira *et al.*, 1994 J. Biol. Chem. 269, 25856).

Such nucleic acids are useful for the prevention of the diseases and conditions discussed above, and any other diseases or conditions that are related to the levels of VEGF-R (specifically flt-1 and flk-1/KDR) in a cell or tissue.

By "related" is meant that the reduction of VEGF-R (specifically flt-1 and flk-1/KDR) RNA levels and thus reduction in the level of the respective protein will relieve, to some extent, the symptoms of the disease or condition.

Ribozymes are added directly, or can be complexed with cationic lipids, packaged within liposomes, or otherwise delivered to target cells or tissues. The nucleic acid or nucleic acid complexes can be locally administered to relevant tissues ex vivo, or in vivo through injection, infusion pump or stent, with or without their incorporation in biopolymers. In preferred embodiments, the ribozymes have binding arms which are complementary to the sequences in Tables II to IX. Examples of such ribozymes also are shown in Tables II to IX. Examples of such ribozymes consist essentially of sequences defined in these Tables. By "consists essentially of" is meant that the active ribozyme contains an enzymatic center equivalent to those in the examples, and binding arms able to bind mRNA such that cleavage at the target site occurs. Other sequences may be present which do not interfere with such cleavage.

In another aspect of the invention, ribozymes that cleave target RNA molecules and inhibit VEGF-R (specifically flt-1 and flk-1/KDR) activity are expressed from transcription units inserted into DNA or RNA vectors. The

recombinant vectors are preferably DNA plasmids or viral vectors. Ribozyme expressing viral vectors could be constructed based on, but not limited to, adeno-associated virus, retrovirus, adenovirus, or alphavirus. Preferably, the recombinant vectors capable of expressing the ribozymes are delivered as described above, and persist in target cells. Alternatively, viral vectors may be used that provide for transient expression of ribozymes. Such vectors might be repeatedly administered as necessary. Once expressed, the ribozymes cleave the target mRNA. Delivery of ribozyme expressing vectors could be systemic, such as by intravenous or intramuscular administration, by administration to target cells ex-planted from the patient followed by reintroduction into the patient, or by any other means that would allow for introduction into the desired target cell.

By "vectors" is meant any nucleic acid- and/or viral-based technique used to deliver a desired nucleic acid.

Other features and advantages of the invention will be apparent from the following description of the preferred embodiments thereof, and from the claims.

<u>Description Of The Preferred Embodiments</u>

First the drawings will be described briefly.

<u>Drawings</u>

Figure 1 is a diagrammatic representation of the hammerhead ribozyme domain known in the art. Stem II can be ≥ 2 base-pair long.

Figure 2a is a diagrammatic representation of the hammerhead ribozyme domain known in the art; Figure 2b is a diagrammatic representation of the hammerhead ribozyme as divided by Uhlenbeck (1987, *Nature*, 327, 596-600) into a substrate and enzyme portion; Figure 2c is a similar diagram showing the hammerhead divided by Haseloff and Gerlach (1988, *Nature*, 334, 585-591) into two portions; and Figure 2d is a similar diagram showing the hammerhead

divided by Jeffries and Symons (1989, *Nucl. Acids. Res.*, 17, 1371-1371) into two portions.

Figure 3 is a diagramatic representation of the general structure of a hairpin ribozyme. Helix 2 (H2) is provided with a least 4 base pairs (*i.e.*, n is 1, 2, 3 or 4) and helix 5 can be optionally provided of length 2 or more bases (preferably 3 - 20 bases, *i.e.*, m is from 1 - 20 or more). Helix 2 and helix 5 may be covalently linked by one or more bases (*i.e.*, r is ≥ 1 base). Helix 1, 4 or 5 may also be extended by 2 or more base pairs (*e.g.*, 4 - 20 base pairs) to stabilize the ribozyme structure, and preferably is a protein binding site. In each instance, each N and N' independently is any normal or modified base and each dash represents a potential base-pairing interaction. These nucleotides may be modified at the sugar, base or phosphate. Complete base-pairing is not required in the helices, but is preferred. Helix 1 and 4 can be of any size (*i.e.*, o and p is each independently from 0 to any number, *e.g.*, 20) as long as some base-pairing is maintained. Essential bases are shown as specific bases in the structure, but those in the art will recognize that one or more may be modified chemically (abasic, base, sugar and/or phosphate modifications) or replaced with another base without significant effect. Helix 4 can be formed from two separate molecules, *i.e.*, without a connecting loop. The connecting loop when present may be a ribonucleotide with or without modifications to its base, sugar or phosphate. "q" is ≥ 2 bases. The connecting loop can also be replaced with a non-nucleotide linker molecule. H refers to bases A, U, or C. Y refers to pyrimidine bases. "_____" refers to a covalent bond.

Figure 4 is a representation of the general structure of the hepatitis delta virus ribozyme domain known in the art.

Figure 5 is a representation of the general structure of the VS RNA ribozyme domain.

Figure 6 is a schematic representation of an RNAseH accessibility assay. Specifically, the left side of Figure 6 is a diagram of complementary DNA oligonucleotides bound to accessible sites on the target RNA. Complementary DNA oligonucleotides are represented by broad lines labeled A, B, and C. Target RNA is represented by the thin, twisted line. The right side of Figure 6 is a schematic of a gel separation of uncut target RNA from a cleaved target RNA. Detection of target RNA is by autoradiography of body-labeled, T7 transcript. The bands common to each lane represent uncleaved target RNA; the bands unique to each lane represent the cleaved products.

Figure 7 shows the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF to the surface of human microvascular endothelial cells. Sequences of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The results of two separate experiments are shown as separate bars for each set. Each bar represents the average of triplicate samples. The standard deviation is shown with error bars. For the flt-1 data, 500 nM ribozyme (3:1 charge ratio with LipofectAMINE®) was used. Control 1-10 is the control for ribozymes 307-2797, control 11-20 is the control for ribozymes 3008-5585. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes.

Figure 8 shows the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial

cells. Sequences of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes. Irrel. RZ, is a control experiment wherein the cells are treated with a non-KDR-targeted ribozyme complexed with Lipofectamine®. 200 nM ribozyme (3:1 charge ratio with LipofectAMINE®) was used. In addition to the KDR-targeted ribozymes, the effect on VEGF binding of a ribozyme targeted to an irrelevant mRNA (irrel. RZ) is also shown. Because the affinity of KDR for VEGF is about 10-fold lower than the affinity of flt-1 for VEGF, a higher concentration of VEGF was used in the binding assay.

Figure 9 shows the specificity of hammerhead ribozymes targeted against flt-1 receptor. Inhibition of the binding of VEGF, urokinase plasminogen activator (UPA) and fibroblast growth factor (FGF) to their corresponding receptors as a function of anti-FLT ribozymes is shown. The sequence and description of the ribozymes used are as described under Figure 7 above. The average of triplicate samples is given; percent inhibition as calculated below.

Figure 10 shows the inhibition of the proliferation of Human aortic endothelial cells (HAEC) mediated by phosphorothioate antisense oligodeoxynucleotides targeted against human KDR receptor RNA. Cell proliferation (O.D. 490) as a function of antisense oligodeoxynucleotide concentration is shown. KDR 21AS represents a 21 nt phosphorothioate antisense oligodeoxynucleotide targeted against KDR RNA. KDR 21 Scram represents a 21 nt

phosphorothioate oligodeoxynucleotide having a scrambled sequence. LF represents the lipid carrier Lipofectin.

Figure 11 shows *in vitro* cleavage of flt-1 RNA by hammerhead ribozymes. A) diagrammatic representation of hammerhead ribozymes targeted against flt-1 RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 1358 HH-A and 4229 HH-A contain 3 base-paired stem II region. 1358 HH-B and 4229 HH-B contain 4 base-paired stem II region. B) and C) shows *in vitro* cleavage kinetics of HH ribozymes targeted against sites 1358 and 4229 within the flt-1 RNA.

Figure 12 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-flt-1 hammerhead ribozymes. A) Diagrammatic representation of hammerhead (HH) ribozymes targeted against sites 1358 and 4229 within the the flt-1 RNA. B) Graphical representation of the inhibition of cell proliferation mediated by 1358HH and 4229HH ribozymes.

Figure 13 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by hammerhead ribozymes targeted against sites 527, 730, 3702 and 3950 within the KDR RNA. Irrelevant HH RZ is a hammerhead ribozyme targeted to an irrelevant target. All of these ribozymes, including the Irrelevant HH RZ, were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four

nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

Figure 14 shows *in vitro* cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 726 HH and 527 HH contain 4 base-paired stem II region. Percent *in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 527 and 726 within the KDR RNA is shown.

Figure 15 shows *in vitro* cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 3702 HH and 3950 HH contain 4 base-paired stem II region. Percent*in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 16 shows *in vitro* cleavage of RNA by hammerhead ribozymes that are targeted to sites that are conserved between flt-1 and KDR RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH).

FLT/KDR-I HH ribozyme was synthesized with either a 4 base-paired or a 3 base-paired stem II region. FLT/KDR-I HH can cleave site 3388 within flt-1 RNA and site 3151 within KDR RNA. Percent *in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 17 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR and anti-flt-1 hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by hammerhead ribozymes targeted against sites KDR sites-527, 726 or 3950 or flt-1 site 4229. The figure also shows enhanced inhibition of cell proliferation by a combination of flt-1 and KDR hammerhead ribozymes. 4229+527, indicates the treatment of cells with both the flt 4229 and the KDR 527 ribozymes. 4229+726, indicates the treatment of cells with both the flt 4229 and the KDR 726 ribozymes. 4229+3950, indicates the treatment of cells with both the flt 4229 and the KDR 3950 ribozymes. VEGF -, indicates the basal level of cell proliferation in the absence of VEGF. A, indicates catalytically active ribozyme; I, indicates catalytically inactive ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

Figure 18 shows the inhibition of VEGF-induced angiogenesis in rat cornea mediated by anti-flt-1 hammerhead ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 position contains 2'-*C*-allyl modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' termini contain

phosphorothioate substitutions. Additionally, the 3′ end of the ribozyme contains a 3′-3′ linked inverted abasic deoxyribose (3′-iH). A decrease in the Surface Area corresponds to a reduction in angiogenesis. VEGF alone, corresponds to treatment of the cornea with VEGF and no ribozymes. Vehicle alone, corresponds to the treatment of the cornea with the carrier alone and no VEGF. This control gives a basal level of Surface Area. Active 4229 HH, corresponds to the treatment of cornea with the flt-1 4229 HH ribozyme in the absence of any VEGF. This control also gives a basal level of Surface Area. Active 4229 HH + VEGF, corresponds to the co-treatment of cornea with the flt-1 4229 HH ribozyme and VEGF. Inactive 4229 HH + VEGF, corresponds to the co-treatment of cornea with a catalytically inactive version of 4229 HH ribozyme and VEGF.

<u>Ribozymes</u>

Ribozymes of this invention block to some extent VEGF-R (specifically flt-1 and flk-1/KDR) production and can be used to treat disease or diagnose such disease. Ribozymes will be delivered to cells in culture, to cells or tissues in animal models of angiogenesis and/or RA and to human cells or tissues *ex vivo* or *in vivo*. Ribozyme cleavage of VEGF-R RNAs (specifically RNAs that encode flt-1 and flk-1/KDR) in these systems may alleviate disease symptoms.

<u>Target sites</u>

Targets for useful ribozymes can be determined as disclosed in Draper *et al.*, International PCT Publication No. WO 95/13380, and hereby incorporated by reference herein in totality. Other examples include the following PCT applications which concern inactivation of expression of disease-related genes: WO 95/23225, WO 95/13380, WO 94/02595, incorporated by reference herein. Rather than repeat the guidance provided in those documents here, below are provided specific examples of such methods, not

limiting to those in the art. Ribozymes to such targets are designed as described in those applications and synthesized to be tested *in vitro* and *in vivo*, as also described.

The sequence of human and mouse flt-1, KDR and/or flk-1 mRNAs were screened for optimal ribozyme target sites using a computer folding algorithm. Hammerhead or hairpin ribozyme cleavage sites were identified. These sites are shown in Tables II to IX (all sequences are 5' to 3' in the tables; X can be any base-paired sequence, the actual sequence is not relevant here). The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme. While mouse and human sequences can be screened and ribozymes thereafter designed, the human targeted sequences are of most utility. However, as discussed in Stinchcomb *et al.*, "Method and Composition for Treatment of Restenosis and Cancer Using Ribozymes," filed May 18, 1994, U.S.S.N. 08/245,466, mouse targeted ribozymes may be useful to test efficacy of action of the ribozyme prior to testing in humans. The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme.

Hammerhead or hairpin ribozymes were designed that could bind and cleave target RNA in a sequence-specific manner. The ribozymes were individually analyzed by computer folding (Jaeger *et al.*, 1989 *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. Varying binding arm lengths can be chosen to optimize activity.

Referring to Figure 6, mRNA is screened for accessible cleavage sites by the method described generally in Draper *et al.*, PCT WO93/23569, hereby incorporated by reference herein. Briefly, DNA oligonucleotides

complementary to potential hammerhead or hairpin ribozyme cleavage sites were synthesized. A polymerase chain reaction is used to generate substrates for T7 RNA polymerase transcription from human and mouse flt-1, KDR and/or flk-1 cDNA clones. Labeled RNA transcripts are synthesized *in vitro* from the templates. The oligonucleotides and the labeled transcripts were annealed, RNAseH was added and the mixtures were incubated for the designated times at 37°C. Reactions are stopped and RNA separated on sequencing polyacrylamide gels. The percentage of the substrate cleaved is determined by autoradiographic quantitation using a PhosphorImaging system. From these data, hammerhead or hairpin ribozyme sites are chosen as the most accessible.

Ribozymes of the hammerhead or hairpin motif were designed to anneal to various sites in the mRNA message. The binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used follows the procedure for normal RNA synthesis as described in Usman *et al.*, 1987 *J. Am. Chem. Soc.*, 109, 7845; Scaringe *et al.*, 1990 *Nucleic Acids Res.*, 18, 5433; and Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684 and makes use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. Small scale synthesis were conducted on a 394 Applied Biosystems, Inc. synthesizer using a modified 2.5 μmol scale protocol with a 5 min coupling step for alkylsilyl protected nucleotides and 2.5 min coupling step for 2'-*O*-methylated nucleotides. Table XI outlines the amounts, and the contact times, of the reagents used in the synthesis cycle. A 6.5-fold excess (163 μL of 0.1 M = 16.3 μmol) of phosphoramidite and a 24-fold excess of *S*-ethyl tetrazole (238 μL of 0.25 M = 59.5 μmol) relative to polymer-bound 5'-hydroxyl was used in each coupling cycle. Average coupling yields on the 394 Applied Biosystems, Inc. synthesizer, determined by

colorimetric quantitation of the trityl fractions, were 97.5-99%. Other oligonucleotide synthesis reagents for the 394 Applied Biosystems, Inc. synthesizer: detritylation solution was 2% TCA in methylene chloride (ABI); capping was performed with 16% *N*-methyl imidazole in THF (ABI) and 10% acetic anhydride/10% 2,6-lutidine in THF (ABI); oxidation solution was 16.9 mM I_2, 49 mM pyridine, 9% water in THF (Millipore). B & J Synthesis Grade acetonitrile was used directly from the reagent bottle. *S*-Ethyl tetrazole solution (0.25 M in acetonitrile) was made up from the solid obtained from American International Chemical, Inc.

Deprotection of the RNA was performed as follows. The polymer-bound oligoribonucleotide, trityl-off, was transferred from the synthesis column to a 4mL glass screw top vial and suspended in a solution of methylamine (MA) at 65 °C for 10 min. After cooling to -20 °C, the supernatant was removed from the polymer support. The support was washed three times with 1.0 mL of EtOH:MeCN:H_2O/3:1:1, vortexed and the supernatant was then added to the first supernatant. The combined supernatants, containing the oligoribonucleotide, were dried to a white powder.

The base-deprotected oligoribonucleotide was resuspended in anhydrous TEA•HF/NMP solution (250 μL of a solution of 1.5mL *N*-methylpyrrolidinone, 750 μL TEA and 1.0 mL TEA•3HF to provide a 1.4M HF concentration) and heated to 65°C for 1.5 h. The resulting, fully deprotected, oligomer was quenched with 50 mM TEAB (9 mL) prior to anion exchange desalting.

For anion exchange desalting of the deprotected oligomer, the TEAB solution was loaded onto a Qiagen 500® anion exchange cartridge (Qiagen Inc.) that was prewashed with 50 mM TEAB (10 mL). After washing the loaded cartridge with 50 mM TEAB (10 mL), the RNA was eluted with 2 M TEAB (10 mL) and dried down to a white powder.

Inactive hammerhead ribozymes were synthesized by substituting a U for G_5 and a U for A_{14} (numbering from

Hertel, K. J., *et al.*, 1992, Nucleic Acids Res., 20, 3252).

The average stepwise coupling yields were >98% (Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684). Hairpin ribozymes are synthesized in two parts and annealed to reconstruct the active ribozyme (Chowrira and Burke, 1992 *Nucleic Acids Res.*, 20, 2835-2840). Ribozymes are also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, *Methods Enzymol.* 180, 51).

All ribozymes are modified extensively to enhance stability by modification with nuclease resistant groups, for example, 2'-amino, 2'-*C*-allyl, 2'-flouro, 2'-*O*-methyl, 2'-H (for a review see Usman and Cedergren, 1992 *TIBS* 17, 34; Usman *et al.*, 1994 *Nucleic Acids Symp. Ser.* 31, 163). Ribozymes are purified by gel electrophoresis using general methods or are purified by high pressure liquid chromatography (HPLC; See Usman *et al.*, PCT Publication No. WO95/23225, the totality of which is hereby incorporated herein by reference) and are resuspended in water.

The sequences of the ribozymes that are chemically synthesized, useful in this study, are shown in Tables II to IX. Those in the art will recognize that these sequences are representative only of many more such sequences where the enzymatic portion of the ribozyme (all but the binding arms) is altered to affect activity. Stem-loop IV sequence of hairpin ribozymes listed in for example Table III (5'-CACGUUGUG-3') can be altered (substitution, deletion, and/or insertion) to contain any sequence, provided a minimum of two base-paired stem structure can form. The sequences listed in Tables II to IX may be formed of ribonucleotides or other nucleotides or non-nucleotides. Such ribozymes are equivalent to the ribozymes described specifically in the Tables.

Optimizing Ribozyme Activity

Ribozyme activity can be optimized as described by Stinchcomb *et al.*, supra. The details will not be repeated here, but include altering the length of the ribozyme binding arms (stems I and III, see Figure 2c), or chemically synthesizing ribozymes with modifications that prevent their degradation by serum ribonucleases (see *e.g.*, Eckstein *et al.*, International Publication No. WO 92/07065; Perrault *et al.*, 1990 *Nature* 344, 565; Pieken *et al.*, 1991 *Science* 253, 314; Usman and Cedergren, 1992 *Trends in Biochem. Sci.* 17, 334; Usman *et al.*, International Publication No. WO 93/15187; Rossi *et al.*, International Publication No. WO 91/03162; Beigelman et al., 1995 *J. Biol Chem.* in press; as well as Sproat, US Patent No. 5,334,711 which describe various chemical modifications that can be made to the sugar moieties of enzymatic RNA molecules). Modifications which enhance their efficacy in cells, and removal of stem II bases to shorten RNA synthesis times and reduce chemical requirements are desired. (All these publications are hereby incorporated by reference herein).

Sullivan, *et al.*, *supra*, describes the general methods for delivery of enzymatic RNA molecules. Ribozymes may be administered to cells by a variety of methods known to those familiar to the art, including, but not restricted to, encapsulation in liposomes, by iontophoresis, or by incorporation into other vehicles, such as hydrogels, cyclodextrins, biodegradable nanocapsules, and bioadhesive microspheres. For some indications, ribozymes may be directly delivered *ex vivo* to cells or tissues with or without the aforementioned vehicles. Alternatively, the RNA/vehicle combination is locally delivered by direct injection or by use of a catheter, infusion pump or stent. Other routes of delivery include, but are not limited to, intravascular, intramuscular, subcutaneous or joint injection, aerosol inhalation, oral (tablet or pill form), topical, systemic, ocular, intraperitoneal and/or intra-

thecal delivery. More detailed descriptions of ribozyme delivery and administration are provided in Sullivan *et al.*, supra and Draper *et al.*, *supra* which have been incorporated by reference herein.

Another means of accumulating high concentrations of a ribozyme(s) within cells is to incorporate the ribozyme-encoding sequences into a DNA or RNA expression vector. Transcription of the ribozyme sequences are driven from a promoter for eukaryotic RNA polymerase I (pol I), RNA polymerase II (pol II), or RNA polymerase III (pol III). Transcripts from pol II or pol III promoters will be expressed at high levels in all cells; the levels of a given pol II promoter in a given cell type will depend on the nature of the gene regulatory sequences (enhancers, silencers, *etc.*) present nearby. Prokaryotic RNA polymerase promoters are also used, providing that the prokaryotic RNA polymerase enzyme is expressed in the appropriate cells (Elroy-Stein and Moss, 1990 *Proc. Natl. Acad. Sci. U S A*, 87, 6743-7; Gao and Huang 1993 *Nucleic Acids Res.*, 21, 2867-72; Lieber *et al.*, 1993 *Methods Enzymol.*, 217, 47-66; Zhou *et al.*, 1990 *Mol. Cell. Biol.*, 10, 4529-37; Thompson *et al.*, 1995 *supra*). Several investigators have demonstrated that ribozymes expressed from such promoters can function in mammalian cells (*e.g.* Kashani-Sabet *et al.*, 1992 *Antisense Res. Dev.*, 2, 3-15; Ojwang *et al.*, 1992 *Proc. Natl. Acad. Sci. U S A*, 89, 10802-6; Chen *et al.*, 1992 *Nucleic Acids Res.*, 20, 4581-9; Yu *et al.*, 1993 *Proc. Natl. Acad. Sci. U S A*, 90, 6340-4; L'Huillier *et al.*, 1992 *EMBO J.* 11, 4411-8; Lisziewicz *et al.*, 1993 *Proc. Natl. Acad. Sci. U. S. A.*, 90, 8000-4; Thompson et al., 1995 *Nucleic Acids Res.* 23, 2259). The above ribozyme transcription units can be incorporated into a variety of vectors for introduction into mammalian cells, including but not restricted to, plasmid DNA vectors, viral DNA vectors (such as adenovirus or adeno-associated virus vectors), or viral RNA vectors (such as retroviral or alphavirus vectors).

In a preferred embodiment of the invention, a transcription unit expressing a ribozyme that cleaves RNAs that encode flt-1, KDR and/or flk-1 are inserted into a plasmid DNA vector or an adenovirus or adeno-associated virus DNA viral vector or a retroviral RNA vector. Viral vectors have been used to transfer genes and lead to either transient or long term gene expression (Zabner *et al.*, 1993 Cell 75, 207; Carter, 1992 Curr. Opi. Biotech. 3, 533). The adenovirus, AAV or retroviral vector is delivered as recombinant viral particles. The DNA may be delivered alone or complexed with vehicles (as described for RNA above). The recombinant adenovirus or AAV or retroviral particles are locally administered to the site of treatment, e.g., through incubation or inhalation *in vivo* or by direct application to cells or tissues *ex vivo*. Retroviral vectors have also been used to express ribozymes in mammalian cells (Ojwang *et al.*, 1992 *supra;* Thompson *et al.*, 1995 *supra*).

flt-1, KDR and/or flk-1 are attractive nucleic acid-based therapeutic targets by several criteria. The interaction between VEGF and VEGF-R is well-established. Efficacy can be tested in well-defined and predictive animal models. Finally, the disease conditions are serious and current therapies are inadequate. Whereas protein-based therapies would inhibit VEGF activity nucleic acid-based therapy provides a direct and elegant approach to directly modulate flt-1, KDR and/or flk-1 expression.

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. At partially homologous sites, a single ribozyme can sometimes be designed to accomodate a site on both mRNAs by including G/U basepairing. For example, if there is a G present in a ribozyme target site in KDR mRNA at the same position there is an A in the flt-1 ribozyme target site, the

ribozyme can be synthesized with a U at the complementary position and it will bind both to sites. The advantage of one ribozyme that targets both VEGF-R mRNAs is clear, especially in cases where both VEGF receptors may contribute to the progression of angiogenesis in the disease state.

"Angiogenesis" refers to formation of new blood vessels which is an essential process in reproduction, development and wound repair. "Tumor angiogenesis" refers to the induction of the growth of blood vessels from surrounding tissue into a solid tumor. Tumor growth and tumor metastasis are dependent on angiogenesis (for a review see Folkman, 1985 *supra;* Folkman 1990 *J. Natl. Cancer Inst.,* 82, 4; Folkman and Shing, 1992 *J. Biol. Chem.* 267, 10931).

Angiogenesis plays an important role in other diseases such as arthritis wherein new blood vessels have been shown to invade the joints and degrade cartilage (Folkman and Shing, *supra*).

"Retinopathy" refers to inflammation of the retina and/or degenerative condition of the retina which may lead to occlusion of the retina and eventual blindness. In "diabetic retinopathy" angiogenesis causes the capillaries in the retina to invade the vitreous resulting in bleeding and blindness which is also seen in neonatal retinopathy (for a review see Folkman, 1985 *supra;* Folkman 1990 *supra;* Folkman and Shing, 1992 *supra*).

<u>Example 1: flt-1, KDR and/or flk-1 ribozymes</u>

By engineering ribozyme motifs applicant has designed several ribozymes directed against flt-1, KDR and/or flk-1 encoded mRNA sequences. These ribozymes were synthesized with modifications that improve their nuclease resistance (Beigelman *et al.,* 1995 *J Biol. Chem.* 270, 25702) and enhance their activity in cells. The ability of ribozymes to cleave target sequences *in vitro* was evaluated essentially as described in Thompson *et al.,* PCT Publication

No. WO 93/23057; Draper *et al.*, PCT Publication No. WO 95/04818.

Example 2: Effect of ribozymes on the binding of VEGF to flt-1, KDR and/or flk-1 receptors

Several common human cell lines are available that express endogenous flt-1, KDR and/or flk-1. flt-1, KDR and/or flk-1 can be detected easily with monoclonal antibodies. Use of appropriate fluorescent reagents and fluorescence-activated cell-sorting (FACS) will permit direct quantitation of surface flt-1, KDR and/or flk-1 on a cell-by-cell basis. Active ribozymes are expected to directly reduce flt-1, KDR and/or flk-1 expression and thereby reduce VEGF binding to the cells. In this example, human umbelical cord microvascular endothelial cells were used.

Cell Preparation:

Plates are coated with 1.5% gelatin and allowed to stand for one hour. Cells (e.g., microvascular endothelial cells derived from human umbilical cord vein) are plated at 20,000 cells/well (24 well plate) in 200 ml growth media and incubated overnight (~ 1 doubling) to yield ~40,000 cells (75-80% confluent).

Ribozyme treatment:

Media is removed from cells and the cells are washed two times with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture. A complex of 200-500 nM ribozyme and LipofectAMINE® (3:1 lipid: phosphate ratio) in 200 ml OptiMEM® (5% FBS) was added to the cells. The cells are incubated for 6 hr (equivalent to 2-3 VEGF-R turnovers).

^{125}I VEGF binding assay:

The assay is carried out on ice to inhibit internalization of VEGF during the experiment. The media containing the ribozyme is removed from the cells and the cells

are washed twice with with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture containing 1% BSA. Appropriate ^{125}I VEGF solution (100,000 cpm/well, +/- 10 X cold 1X PBS, 1% BSA) was applied to the cells. The cells are incubated on ice for 1 h. ^{125}I VEGF-containing solution is removed and the cells are washed three times with with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture containing 1% BSA. To each well 300 ml of 100 mM Tris-HCl, pH 8.0, 0.5% Triton X-100 was added and the the mixture was incubated for 2 min. The ^{125}I VEGF-binding was quantitated using standard scintillation counting techniques. Percent inhibition was calculated as follows:

$$\text{Percent Inhibition} = \frac{\text{cpm } ^{125}\text{I VEGF bound by the ribozyme-treated samples}}{\text{cpm } ^{125}\text{I VEGF bound by the Control sample}} \times 100$$

Example 3: Effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty sites within flt-1 RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, 3' end of the ribozyme contains a 3'-3' linked inverted abasic ribose.

Referring to Figure 7, the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF to flt-1 on the surface of human microvascular endothelial cells is shown. The majority of the ribozymes tested were able to inhibit the expression of flt-1 and thereby were able to inhibit the binding of VEGF.

In order to determine the specificity of ribozymes targeted against flt-1 RNA, the effect of five anti-flt-1 ribozymes on the binding of VEGF, UPA (urokinase plasmino-

gen activator) and FGF (fibroblast growth factor) to their corresponding receptors were assayed. As shown in Figure 9, there was significant inhibition of VEGF binding to its receptors on cells treated with anti-flt-1 ribozymes. There was no specific inhibition of the binding of UPA and FGF to their corresponding receptors. These data strongly suggest that anti-flt-1 ribozymes specifically cleave flt-1 RNA and not RNAs encoding the receptors for UPA and FGF, resulting in the inhibition of flt-1 receptor expression on the surface of the cells. Thus the ribozymes are responsible for the inhibition of VEGF binding but not the binding of UPA and FGF.

Example 4: Effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty one sites within KDR RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose.

Referring to Figure 8, the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial cells is shown. A majority of the ribozymes tested were able to inhibit the expression of KDR and thereby were able to inhibit the binding of VEGF. As a control, the cells were treated with a ribozyme that is not targeted towards KDR RNA (irrel. RZ); there was no specific inhibition of VEGF binding. The results from this control experiment strongly suggest that the inhibi-

tion of VEGF binding observed with anti-KDR ribozymes is a ribozyme-mediated inhibition.

Example 5: Effect of ribozymes targeted against VEGF receptors on cell proliferation

Cell Preparation:

24-well plates are coated with 1.5% gelatin (porcine skin 300 bloom). After 1 hr, excess gelatin is washed off of the plate. Microvascular endothelial cells are plated at 5,000 cells/well (24 well plate) in 200 ml growth media. The cells are allowed to grow for ~ 18 hr (~ 1 doubling) to yield ~10,000 cells (25-30% confluent).

Ribozyme treatment:

Media is removed from the cells, and the cells are washed two times with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture.

For anti-flt-1 HH ribozyme experiment (Figure 12) a complex of 500 nM ribozyme; 15 mM LFA (3:1 lipid:phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 6 hr (equivalent to 2-3 VEGF receptor turnovers).

For anti-KDR HH ribozyme experiment (Figure 13) a complex of 200 nM ribozyme; 5.25 mM LFA (3:1 lipid: phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 3 hr.

Proliferation:

After three or six hours, the media is removed from the cells and the cells are washed with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture. Maintenance media (contains dialyzed 10% FBS) +/- VEGF or basic FGF at 10 ng/ml is added to the cells. The cells are incubated for 48 or 72 h. The cells are trypsinized and counted (Coulter counter). Trypan blue is added on one well of each treatment as control.

As shown in Figure 12B, VEGF and basic FGF can stimulate human microvascular endothelial cell proliferation. However, treatment of cells with 1358 HH or 4229 HH ribozymes, targeted against flt-1 mRNA, results in a significant decrease in the ability of VEGF to stimulate endothelial cell proliferation. These ribozymes do not inhibit the FGF-mediated stimulation of endothelial cell proliferation.

Human microvascular endothalial cells were also treated with hammerhead ribozymes targeted against sites 527, 730, 3702 or 3950 within the KDR mRNA. As shown in Figure 13, all four ribozymes caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a hammerhead ribozyme targeted to an irrelevant RNA. Additionally, none of the ribozymes inhibited FGF-mediated stimulation of cell proliferation.

These results strongly suggest that hammerhead ribozymes targeted against either flt-1 or KDR mRNA can specifically inhibit VEGF-mediated induction of endothelial cell proliferation.

Example 6: Effect of antisense oligonucleotides targeted against VEGF receptors on cell proliferation (colorimetric assay)

Following are some of the reagents used in the proliferation assay:

Cells: Human aortic endothelial cells (HAEC) from Clonetics®. Cells at early passage are preferably used.

Uptake Medium: EBM (from Clonetics®);1% L-Glutamine;20 mM Hepes; No serum; No antibiotics.

Growth Medium: EGM (from Clonetics®);FBS to 20%;1% L-Glutamine;20 mM Hepes.

Cell Plating: 96-well tissue culture plates are coated with 0.2% gelatin (50 ml/well). The gelatin is incubated in the wells at room temperature for 15-30

minutes. The gelatin is removed by aspiration and the wells are washed with PBS:Ca^{2+}: Mg^{2+} mixture. PBS mixture is left in the wells until cells are ready to be added. HAEC cells were detached by trypsin treatment and resuspended at 1.25 x 10^4/ml in growth medium. PBS is removed from plates and 200 ml of cells (i.e. 2.5 x 10^3 cells/well) are added to each well. The cells are allowed to grow for 48 hours before the proliferation assay.

<u>Assay</u>: Growth medium is removed from the wells. The cells are washed twice with PBS:Ca^{2+}: Mg^{2+} mixture without antibiotics. A formulation of lipid/antisense oligonucleotide (antisense oligonucleotide is used here as a non-limiting example) complex is added to each well (100 ml/well) in uptake medium. The cells are incubated for 2-3 hours at 37°C in CO_2 incubator. After uptake, 100 ml/well of growth medium is added (gives final FBS concentration of 10%). After approximately 72 hours, 40 ml MTS® stock solution (made as described by manufacturer) was added to each well and incubated at 37°C for 1-3 hours, depending on the color development. (For this assay, 2 hours was sufficient). The intensity of color formation was determined on a plate reader at 490 nM.

Phosphorothioate-substituted antisense oligodeoxynucleotides were custom synthesized by The Midland Certified Reagent Company®, Midland, Texas. Following non-limiting antisense oligodeoxynucleotides targeted against KDR RNA were used in the proliferation assay:

KDR 21 AS: 5'-GCA GCA CCT TGC TCT CCA TCC-3'

SCRAMBLED CONTROL: 5'-CTG CCA ACT TCC CAT GCC TGC-3'

As shown in Figure 10, proliferation of HAEC cells are specifically inhibited by increasing concentrations of the phosphorothioate anti-KDR-antisense oligodeoxynucleotide. The scrambled antisense oligonucleotide is not expected to bind the KDR RNA and therefore is not expected to inhibit KDR expression. As expected, there is no detectable inhibition of proliferation of HAEC cells

treated with a phosphorothioate antisense oligonucleotide with scrambled sequence.

Example 7: *In vitro* cleavage of flt-1 RNA by hammerhead ribozymes

Referring to Figure 11A, hammerhead ribozymes (HH) targeted against sites 1358 and 4229 within the flt-1 RNA were synthesized as described above.

RNA cleavage assay *in vitro*:

Substrate RNA was 5' end-labeled using [g-^{32}P] ATP and T4 polynucleotide kinase (US Biochemicals). Cleavage reactions were carried out under ribozyme "excess" conditions. Trace amount ($\leq$ 1 nM) of 5' end-labeled substrate and 40 nM unlabeled ribozyme were denatured and renatured separately by heating to 90°C for 2 min and snap-cooling on ice for 10-15 min. The ribozyme and substrate were incubated, separately, at 37°C for 10 min in a buffer containing 50 mM Tris-HCl and 10 mM $MgCl_2$. The reaction was initiated by mixing the ribozyme and substrate solutions and incubating at 37°C. Aliquots of 5 ml are taken at regular intervals of time and the reaction is quenched by mixing with equal volume of 2X formamide stop mix. The samples are resolved on 20 % denaturing polyacrylamide gels. The results were quantified and percentage of target RNA cleaved is plotted as a function of time.

Referring to Figure 11B and 11C, hammerhead ribozymes targeted against sites 1358 and 4229 within the flt-1 RNA are capable of cleaving target RNA efficiently *in vitro*.

Example 8: *In vitro* cleavage of KDR RNA by hammerhead ribozymes

In this non-limiting example, hammerhead ribozymes targeted against sites 726, 527, 3702 and 3950 within KDR RNA were synthesized as described above. RNA cleavage reactions were carried out *in vitro* essentially as described under Example 7.

Referring to Figures 14 and 15, all four ribozymes were able to cleave their cognate target RNA efficiently in a sequence-specific manner.

Example 9: *In vitro* cleavage of RNA by hammerhead ribozymes targeted against cleavage sites that are homologous between KDR and flt-1 mRNA

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. Hammerhead ribozyme (FLT/KDR-I) targeted against one of the homologous sites between flt-1 and KDR (flt-1 site 3388 and KDR site 3151) was synthesized as described above. Ribozymes with either a 3 bp stem II or a 4 bp stem II were synthesized. RNA cleavage reactions were carried out *in vitro* essentially as described under Example 7.

Referring to Figure 16, FLT/KDR-I ribozyme with either a 3 or a 4 bp stem II was able to cleave its target RNA efficiently *in vitro*.

Example 10: Effect of multiple ribozymes targeted against both flt-1 and KDR RNA on cell proliferation

Since both flt-1 and KDR receptors of VEGF are involved in angiogenesis, the inhibition of the expression of both of these genes may be an effective approach to inhibit angiogenesis.

Human microvascular endothalial cells were treated with hammerhead ribozymes targeted against sites flt-1 4229 alone, KDR 527 alone, KDR 726 alone, KDR 3950 alone, flt-1 4229 + KDR 527, flt-1 4229 + KDR 726 or flt-1 4229 + KDR 3950. As shown in Figure 17, all the combinations of active ribozymes (A) caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a catalytically inactive (I) hammerhead ribozymes. Additionally, cells treated

with ribozymes targeted against both flt-1 and KDR RNAs-flt-1 4229 + KDR 527; flt-1 4229 + KDR 726; flt-1 4229 + KDR 3950, were able to cause a greater inhibition of VEGF-mediated induction of cell proliferation when compared with individual ribozymes targeted against either flt-1 or KDR RNA (see flt-1 4229 alone; KDR 527 alone; KDR 726 alone; KDR 3950 alone). This strongly suggests that treatment of cells with multiple ribozymes may be a more effective means of inhibition of gene expression.

Animal Models

There are several animal models in which the anti-angiogenesis effect of nucleic acids of the present invention, such as ribozymes, directed against VEGF-R mRNAs can be tested. Typically a corneal model has been used to study angiogenesis in rat and rabbit since recruitment of vessels can easily be followed in this normally avascular tissue (Pandey *et al.*, 1995 *Science* 268: 567-569). In these models, a small Teflon or Hydron disk pretreated with an angiogenesis factor (e.g. bFGF or VEGF) is inserted into a pocket surgically created in the cornea. Angiogenesis is monitored 3 to 5 days later. Ribozymes directed against VEGF-R mRNAs would be delivered in the disk as well, or dropwise to the eye over the time course of the experiment. In another eye model, hypoxia has been shown to cause both increased expression of VEGF and neovascularization in the retina (Pierce *et al.*, 1995 *Proc. Natl. Acad. Sci.* USA. 92: 905-909; Shweiki *et al.*, 1992 *J. Clin. Invest.* 91: 2235-2243).

In human glioblastomas, it has been shown that VEGF is at least partially responsible for tumor angiogenesis (Plate *et al.*, 1992 *Nature* 359, 845). Animal models have been developed in which glioblastoma cells are implanted subcutaneously into nude mice and the progress of tumor growth and angiogenesism is studied (Kim *et al.*, 1993 *supra*; Millauer *et al.*, 1994 *supra*).

Another animal model that addresses neovascularization involves Matrigel, an extract of basement membrane that becomes a solid gel when injected subcutaneously (Passaniti *et al.*, 1992 *Lab. Invest.* 67: 519-528). When the Matrigel is supplemented with angiogenesis factors such as VEGF, vessels grow into the Matrigel over a period of 3 to 5 days and angiogenesis can be assessed. Again, ribozymes directed against VEGF-R mRNAs would be delivered in the Matrigel.

Several animal models exist for screening of anti-angiogenic agents. These include corneal vessel formation following corneal injury (Burger *et al.*, 1985 *Cornea* 4: 35-41; Lepri, *et al.*, 1994 *J. Ocular Pharmacol.* 10: 273-280; Ormerod *et al.*, 1990 *Am. J. Pathol.* 137: 1243-1252) or intracorneal growth factor implant (Grant *et al.*, 1993 *Diabetologia* 36: 282-291; Pandey *et al.* 1995 *supra;* Zieche *et al.*, 1992 *Lab. Invest.* 67: 711-715), vessel growth into Matrigel matrix containing growth factors (Passaniti *et al.*, 1992 *supra*), female reproductive organ neovascularization following hormonal manipulation (Shweiki *et al.*, 1993 *Clin. Invest.* 91: 2235-2243), several models involving inhibition of tumor growth in highly vascularized solid tumors (O'Reilly *et al.*, 1994 *Cell* 79: 315-328; Senger *et al.*, 1993 *Cancer and Metas. Rev.* 12: 303-324; Takahasi *et al.*, 1994 *Cancer Res.* 54: 4233-4237; Kim *et al.*, 1993 *supra*), and transient hypoxia-induced neovascularization in the mouse retina (Pierce *et al.*, 1995 *Proc. Natl. Acad. Sci.* USA. 92: 905-909).

The cornea model, described in Pandey et al. *supra*, is the most common and well characterized anti-angiogenic agent efficacy screening model. This model involves an avascular tissue into which vessels are recruited by a stimulating agent (growth factor, thermal or alkalai burn, endotoxin). The corneal model would utilize the intrastromal corneal implantation of a Teflon pellet soaked in a VEGF-Hydron solution to recruit blood vessels toward the pellet which can be quantitated using standard microscopic

and image analysis techniques. To evaluate their anti-angiogenic efficacy, ribozymes are applied topically to the eye or bound within Hydron on the Teflon pellet itself. This avascular cornea as well as the Matrigel (see below) provide for low background assays. While the corneal model has been performed extensively in the rabbit, studies in the rat have also been conducted.

The mouse model (Passaniti et al., *supra*) is a non-tissue model which utilizes Matrigel, an extract of basement membrane (Kleinman et al., 1986) or Millipore® filter disk, which can be impregnated with growth factors and anti-angiogenic agents in a liquid form prior to injection. Upon subcutaneous administration at body temperature, the Matrigel or Millipore® filter disk forms a solid implant. VEGF embedded in the Matrigel or Millipore® filter disk would be used to recruit vessels within the matrix of the Matrigel or Millipore® filter disk which can be processed histologically for endothelial cell specific vWF (factor VIII antigen) immunohistochemistry, Trichrome-Masson stain, or hemoglobin content. Like the cornea, the Matrigel or Millipore® filter disk are avascular; however, it is not tissue. In the Matrigel or Millipore® filter disk model, ribozymes are administered within the matrix of the Matrigel or Millipore® filter disk to test their anti-angiogenic efficacy. Thus, delivery issues in this model, as with delivery of ribozymes by Hydron-coated Teflon pellets in the rat cornea model, may be less problematic due to the homogeneous presence of the ribozyme within the respective matrix.

These models offer a distinct advantage over several other angiogenic models listed previously. The ability to use VEGF as a pro-angiogenic stimulus in both models is highly desirable since ribozymes will target only VEGFr mRNA. In other words, the involvement of other non-specific types of stimuli in the cornea and Matrigel models is not advantageous from the standpoint of understanding the pharmacologic mechanism by which the

anti-VEGFr mRNA ribozymes produce their effects. In addition, the models will allow for testing the specificity of the anti-VEGFr mRNA ribozymes by using either a- or bFGF as a pro-angiogenic factor. Vessel recruitment using FGF should not be affected in either model by anti-VEGFr mRNA ribozymes. Other models of angiogenesis including vessel formation in the female reproductive system using hormonal manipulation (Shweiki *et al.*, 1993 *supra*); a variety of vascular solid tumor models which involve indirect correlations with angiogenesis (O'Reilly *et al.*, 1994 *supra*; Senger *et al.*, 1993 *supra*; Takahasi *et al.*, 1994 *supra*; Kim *et al.*, 1993 *supra*); and retinal neovascularization following transient hypoxia (Pierce *et al.*, 1995 *supra*) were not selected for efficacy screening due to their non-specific nature, although there is a correlation between VEGF and angiogenesis in these models.

Other model systems to study tumor angiogenesis is reviewed by Folkman, 1985 *Adv. Cancer. Res.*. 43, 175.

flt-1, KDR and/or flk-1 protein levels can be measured clinically or experimentally by FACS analysis. flt-1, KDR and/or flk-1 encoded mRNA levels will be assessed by Northern analysis, RNase-protection, primer extension analysis and/or quantitative RT-PCR. Ribozymes that block flt-1, KDR and/or flk-1 protein encoding mRNAs and therefore result in decreased levels of flt-1, KDR and/or flk-1 activity by more than 20% *in vitro* will be identified.

Ribozymes and/or genes encoding them are delivered by either free delivery, liposome delivery, cationic lipid delivery, adeno-associated virus vector delivery, adenovirus vector delivery, retrovirus vector delivery or plasmid vector delivery in these animal model experiments (see above).

Patients can be treated by locally administering nucleic acids targeted against VEGF-R by direct injection. Routes of administration may include, but are not limited to, intravascular, intramuscular, subcutaneous, intra-

articular, aerosol inhalation, oral (tablet, capsule or pill form), topical, systemic, ocular, intraperitoneal and/or intrathecal delivery.

Example 11: Ribozyme-mediated inhibition of angiogenesis *in vivo*

The purpose ot this study was to assess the anti-angiogenic activity of hammerhead ribozymes targeted against flt-1 4229 site in the rat cornea model of VEGF induced angiogenesis (see above). These ribozymes have either active or inactive catalytic core and either bind and cleave or just bind to VEGF-R mRNA of the flt-1 subtype. The active ribozymes, that are able to bind and cleave the target RNA, have been shown to inhibit (^{125}I-labeled) VEGF binding in cultured endothelial cells and produce a dose-dependent decrease in VEGF induced endothelial cell proliferation in these cells (see Examples 3-5 above). The catalytically inactive forms of these ribozymes, wherein the ribozymes can only bind to the RNA but cannot catalyze RNA cleavage, fail to show these characteristics. The ribozymes and VEGF were co-delivered using the filter disk method: Nitrocellulose filter disks (Millipore®) of 0.057 diameter were immersed in appropriate solutions and were surgically implanted in rat cornea as described by Pandey *et al.*, *supra*. This delivery method has been shown to deliver rhodamine-labeled free ribozyme to scleral cells and, in all likelihood cells of the pericorneal vascular plexus. Since the active ribozymes show cell culture efficacy and can be delivered to the target site using the disk method, it is essential that these ribozymes be assessed for *in vivo* anti-angiogenic activity.

The stimulus for angiogenesis in this study was the treatment of the filter disk with 30 mM VEGF which is implanted within the cornea's stroma. This dose yields reproducible neovascularization stemming from the pericorneal vascular plexus growing toward the disk in a

dose-response study 5 days following implant. Filter disks treated only with the vehicle for VEGF show no angiogenic response. The ribozymes was co-adminstered with VEGF on a disk in two different ribozyme concentrations. One concern with the simultaneous administration is that the ribozymes will not be able to inhibit angiogenesis since VEGF receptors can be stimulated. However, we have observed that in low VEGF doses, the neovascular response reverts to normal suggesting that the VEGF stimulus is essential for maintaining the angiogenic response. Blocking the production of VEGF receptors using simultaneous administration of anti-VEGF-R mRNA ribozymes could attenuate the normal neovascularization induced by the filter disk treated with VEGF.

<u>Materials and Methods:</u>

1. <u>Stock hammerhead ribozyme solutions</u>:
   a. flt-1 4229 (786 μM)- Active
   b. flt-1 4229 (736 μM)- Inactive

2. <u>Experimantal solutions/groups:</u>

Group 1	Solution 1	Control VEGF solution: 30 μM in 82mM Tris base
Group 2	Solution 2	flt-1 4229 (1 μg/μL) in 30 μM VEGF/82 mM Tris base
Group 3	Solution 3	flt-1 4229 (10 μg/μL) in 30 μM VEGF/82 mM Tris base
Group 4	Solution 4	No VEGF, flt-1 4229 (10 μg/μL) in 82 mM Tris base
Group 5	Solution 5	No VEGF, No ribozyme in 82 mM Tris base

10 eyes per group, 5 animals (Since they have similar molecular weights, the molar concentrations should be essentially similar).

Each solution (VEGF and RIBOZYMES) were prepared as a 2X solution for 1:1 mixing for final concentrations

above, with the exception of solution 1 in which VEGF was 2X and diluted with ribozyme diluent (sterile water).

3. <u>VEGF Solutions</u>

The 2X VEGF solution (60 μM) was prepared from a stock of 0.82 μg/μL in 50 mM Tris base. 200 μL of VEGF stock was concentrated by speed vac to a final volume of 60.8 μL, for a final concentration of 2.7 μg/μL or 60 μM. Six 10 μL aliquots was prepared for daily mixing. 2X solutions for VEGF and Ribozyme was stored at 4°C until the day of the surgery. Solutions were mixed for each day of surgery. Original 2X solutions was prepared on the day before the first day of the surgery.

4. <u>Surgical Solutions:</u>

<u>Anesthesia:</u>

stock ketamine hydrochloride 100 mg/mL
stock xylazine hydrochloride 20 mg/mL
stock acepromazine 10 mg/mL

<u>Final anesthesia solution</u>: 50 mg/mL ketamine, 10 mg/mL xylazine, and 0.5 mg/mL acepromazine

5% povidone iodine for opthalmic surgical wash
2% lidocaine (sterile) for opthalmic administration (2 drops per eye)
sterile 0.9% NaCl for opthalmic irrigation

5. <u>Surgical Methods:</u>

Standard surgical procedure as described in Pandey *et al., supra*. Filter disks were incubated in 1 μL of each solution for approximately 30 minutes prior to implantation.

5. <u>Experimental Protocol:</u>

The animal cornea were treated with the treatment groups as described above. Animals were allowed to recover for 5 days after treatment with daily observation (scoring 0 - 3). On the fifth day animals were euthanized and

digital images of each eye was obtained for quantitaion using Image Pro Plus. Quantitated neovascular surface area were analyzed by ANOVA followed by two post-hoc tests including Dunnets and Tukey-Kramer tests for significance at the 95% confidence level. Dunnets provide information on the significance between the differences within the means of treatments vs. controls while Tukey-Kramer provide information on the significance of differences within the means of each group.

Results are graphically represented in Figure 18. As shown in the figure, flt-1 4229 active hammerhead ribozyme at both concentrations was effective at inhibiting angiogenesis while the inactive ribozyme did not show any significant reduction in angiogenesis. A statistically signifiant reduction in neovascular surface area was observed only with active ribozymes. This result clearly shows that the ribozymes are capable of significantly inhibiting angiogenesis *in vivo*. Specifically, the mechanism of inhibition appears to be by the binding and cleavage of target RNA by ribozymes.

Diagnostic uses

Ribozymes of this invention may be used as diagnostic tools to examine genetic drift and mutations within diseased cells or to detect the presence of flt-1, KDR and/or flk-1 RNA in a cell. The close relationship between ribozyme activity and the structure of the target RNA allows the detection of mutations in any region of the molecule which alters the base-pairing and three-dimensional structure of the target RNA. By using multiple ribozymes described in this invention, one may map nucleotide changes which are important to RNA structure and function *in vitro*, as well as in cells and tissues. Cleavage of target RNAs with ribozymes may be used to inhibit gene expression and define the role (essentially) of specified gene products in the progression of disease. In this manner, other genetic targets

may be defined as important mediators of the disease. These experiments will lead to better treatment of the disease progression by affording the possibility of combinational therapies (*e.g.*, multiple ribozymes targeted to different genes, ribozymes coupled with known small molecule inhibitors, or intermittent treatment with combinations of ribozymes and/or other chemical or biological molecules). Other *in vitro* uses of ribozymes of this invention are well known in the art, and include detection of the presence of mRNAs associated with flt-1, KDR and/or flk-1 related condition. Such RNA is detected by determining the presence of a cleavage product after treatment with a ribozyme using standard methodology.

In a specific example, ribozymes which can cleave only wild-type or mutant forms of the target RNA are used for the assay. The first ribozyme is used to identify wild-type RNA present in the sample and the second ribozyme will be used to identify mutant RNA in the sample. As reaction controls, synthetic substrates of both wild-type and mutant RNA will be cleaved by both ribozymes to demonstrate the relative ribozyme efficiencies in the reactions and the absence of cleavage of the "non-targeted" RNA species. The cleavage products from the synthetic substrates will also serve to generate size markers for the analysis of wild-type and mutant RNAs in the sample population. Thus each analysis will require two ribozymes, two substrates and one unknown sample which will be combined into six reactions. The presence of cleavage products will be determined using an RNAse protection assay so that full-length and cleavage fragments of each RNA can be analyzed in one lane of a polyacrylamide gel. It is not absolutely required to quantify the results to gain insight into the expression of mutant RNAs and putative risk of the desired phenotypic changes in target cells. The expression of mRNA whose protein product is implicated in the development of the phenotype (*i.e.*, flt-1, KDR and/or flk-1) is adequate to establish

risk. If probes of comparable specific activity are used for both transcripts, then a qualitative comparison of RNA levels will be adequate and will decrease the cost of the initial diagnosis. Higher mutant form to wild-type ratios will be correlated with higher risk whether RNA levels are compared qualitatively or quantitatively.

Other embodiments are within the following claims.

Table I

Characteristics of Ribozymes

Group I Introns

Size: ~200 to >1000 nucleotides

Requires a U in the target sequence immediately 5' of the cleavage site.

Binds 4-6 nucleotides at 5' side of cleavage site.

Over 75 known members of this class. Found in *Tetrahymena thermophila* rRNA, fungal mitochondria, chloroplasts, phage T4, blue-green algae, and others.

RNAseP RNA (M1 RNA)

Size: ~290 to 400 nucleotides

RNA portion of a ribonucleoprotein enzyme. Cleaves tRNA precursors to form mature tRNA.

Roughly 10 known members of this group all are bacterial in origin.

Hammerhead Ribozyme

Size: ~13 to 40 nucleotides.

Requires the target sequence UH immediately 5' of the cleavage site.

Binds a variable number of nucleotides on both sides of the cleavage site.

14 known members of this class. Found in a number of plant pathogens (virusoids) that use RNA as the infectious agent (Figure 1 and 2)

Hairpin Ribozyme

Size: ~50 nucleotides.

Requires the target sequence GUC immediately 3' of the cleavage site.

Binds 4-6 nucleotides at 5' side of the cleavage site and a variable number to the 3' side of the cleavage site.

Only 3 known member of this class. Found in three plant pathogen (satellite RNAs of the tobacco ringspot virus,

arabis mosaic virus and chicory yellow mottle virus) which uses RNA as the infectious agent (Figure 3).

Hepatitis Delta Virus (HDV) Ribozyme

Size: 50-60 nucleotides (at present)

Sequence requirements not fully determined.

Binding sites and structural requirements not fully determined, although no sequences 5' of cleavage site are required.

Only 1 known member of this class. Found in human HDV (Figure 4).

Neurospora VS RNA Ribozyme

Size: ~144 nucleotides (at present)

Cleavage of target RNAs recently demonstrated.

Sequence requirements not fully determined.

Binding sites and structural requirements not fully determined. Only 1 known member of this class. Found in *Neurospora* VS RNA (Figure 5).

Table II: Human *flt*1 VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Position	HH Ribozyme	Substrate
10	GCCGAGAG CUGAUGA X GAA AGUGUCCG	CGGACACUC CUCUCGGC
13	GGAGCCGA CUGAUGA X GAA AGGAGUGU	ACACUCCUC UCGGCUCC
15	GAGGAGCC CUGAUGA X GAA AGAGGAGU	ACUCCUCUC GGCUCCUC
20	CCGGGGAG CUGAUGA X GAA AGCCGAGA	UCUCGGCUC CUCCCCGG
23	CUGCCGGG CUGAUGA X GAA AGGAGCCG	CGGCUCCUC CCCGGCAG
43	CCCGCUCC CUGAUGA X GAA AGCCGCCG	CGGCGGCUC GGAGCGGG
54	GAGCCCCG CUGAUGA X GAA AGCCCGCU	AGCGGGCUC CGGGGCUC
62	CUGCACCC CUGAUGA X GAA AGCCCCGG	CCGGGGCUC GGGUGCAG
97	CCCCGGGU CUGAUGA X GAA AUCCUCGC	GCGAGGAUU ACCCGGGG
98	UCCCCGGG CUGAUGA X GAA AAUCCUCG	CGAGGAUUA CCCGGGGA

113	CAGGAGAC CUGAUGA X GAA ACCACUUC	GAAGUGGUU GUCUCCUG
116	AGCCAGGA CUGAUGA X GAA ACAACCAC	GUGGUUGUC UCCUGGCU
118	CCAGCCAG CUGAUGA X GAA AGACAACC	GGUUGUCUC CUGGCUGG
145	CGCGCCCU CUGAUGA X GAA AGCGCCCG	CGGGCGCUC AGGGCGCG
185	GGCCGCCA CUGAUGA X GAA AGUCCGUC	GACGGACUC UGGCGGCC
198	CGGCCAAC CUGAUGA X GAA ACCCGGCC	GGCCGGGUC GUUGGCCG
201	CCCCGGCC CUGAUGA X GAA ACGACCCG	CGGGUCGUU GGCCGGGG
240	GUGAGCGC CUGAUGA X GAA ACGCGGCC	GGCCGCGUC GCGCUCAC
246	ACCAUGGU CUGAUGA X GAA AGCGCGAC	GUCGCGCUC ACCAUGGU
255	CAGUAGCU CUGAUGA X GAA ACCAUGGU	ACCAUGGUC AGCUACUG
260	UGUCCCAG CUGAUGA X GAA AGCUGACC	GGUCAGCUA CUGGGACA
276	CACAGCAG CUGAUGA X GAA ACCCCGGU	ACCGGGGUC CUGCUGUG
294	AGACAGCU CUGAUGA X GAA AGCAGCGC	GCGCUGCUC AGCUGUCU
301	GAGAAGCA CUGAUGA X GAA ACAGCUGA	UCAGCUGUC UGCUUCUC
306	CCUGUGAG CUGAUGA X GAA AGCAGACA	UGUCUGCUU CUCACAGG
307	UCCUGUGA CUGAUGA X GAA AAGCAGAC	GUCUGCUUC UCACAGGA
309	GAUCCUGU CUGAUGA X GAA AGAAGCAG	CUGCUUCUC ACAGGAUC
317	CUGAACUA CUGAUGA X GAA AUCCUGUG	CACAGGAUC UAGUUCAG
319	ACCUGAAC CUGAUGA X GAA AGAUCCUG	CAGGAUCUA GUUCAGGU
322	UGAACCUG CUGAUGA X GAA ACUAGAUC	GAUCUAGUU CAGGUUCA
323	UUGAACCU CUGAUGA X GAA AACUAGAU	AUCUAGUUC AGGUUCAA
328	UAAUUUUG CUGAUGA X GAA ACCUGAAC	GUUCAGGUU CAAAAUUA
329	UUAAUUUU CUGAUGA X GAA AACCUGAA	UUCAGGUUC AAAAUUAA
335	GAUCUUUU CUGAUGA X GAA AUUUUGAA	UUCAAAAUU AAAAGAUC
336	GGAUCUUU CUGAUGA X GAA AAUUUUGA	UCAAAAUUA AAAGAUCC
343	CAGUUCAG CUGAUGA X GAA AUCUUUUA	UAAAAGAUC CUGAACUG
355	GCCUUUUA CUGAUGA X GAA ACUCAGUU	AACUGAGUU UAAAAGGC
356	UGCCUUUU CUGAUGA X GAA AACUCAGU	ACUGAGUUU AAAAGGCA
357	GUGCCUUU CUGAUGA X GAA AAACUCAG	CUGAGUUUA AAAGGCAC
375	GCUUGCAU CUGAUGA X GAA AUGUGCUG	CAGCACAUC AUGCAAGC
400	GCAUUGGA CUGAUGA X GAA AUGCAGUG	CACUGCAUC UCCAAUGC
402	CUGCAUUG CUGAUGA X GAA AGAUGCAG	CUGCAUCUC CAAUGCAG
427	AGACCAUU CUGAUGA X GAA AUGGGCUG	CAGCCCAUA AAUGGUCU

434	CAGGCAAA	CUGAUGA	X	GAA	ACCAUUUA	UAAAUGGUC	UUUGCCUG
436	UUCAGGCA	CUGAUGA	X	GAA	AGACCAUU	AAUGGUCUU	UGCCUGAA
437	UUUCAGGC	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUU	GCCUGAAA
454	GCUUUCCU	CUGAUGA	X	GAA	ACUCACCA	UGGUGAGUA	AGGAAAGC
477	GAUUUAGU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUA	ACUAAAUC
481	GGCAGAUU	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA	AAUCUGCC
485	CACAGGCA	CUGAUGA	X	GAA	AUUUAGUU	AACUAAAUC	UGCCUGUG
512	UACUGCAG	CUGAUGA	X	GAA	AUUGUUUG	CAAACAAUU	CUGCAGUA
513	GUACUGCA	CUGAUGA	X	GAA	AAUUGUUU	AAACAAUUC	UGCAGUAC
520	GGUUAAAG	CUGAUGA	X	GAA	ACUGCAGA	UCUGCAGUA	CUUUAACC
523	CAAGGUUA	CUGAUGA	X	GAA	AGUACUGC	GCAGUACUU	UAACCUUG
524	UCAAGGUU	CUGAUGA	X	GAA	AAGUACUG	CAGUACUUU	AACCUUGA
525	UUCAAGGU	CUGAUGA	X	GAA	AAAGUACU	AGUACUUUA	ACCUUGAA
530	CUGUGUUC	CUGAUGA	X	GAA	AGGUUAAA	UUUAACCUU	GAACACAG
541	GUUUGCUU	CUGAUGA	X	GAA	AGCUGUGU	ACACAGCUC	AAGCAAAC
560	AGCUGUAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCUU	CUACAGCU
561	CAGCUGUA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUC	UACAGCUG
563	UGCAGCUG	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUA	CAGCUGCA
575	CAGCUAGA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUA	UCUAGCUG
577	UACAGCUA	CUGAUGA	X	GAA	AUAUUUGC	GCAAAUAUC	UAGCUGUA
579	GGUACAGC	CUGAUGA	X	GAA	AGAUAUUU	AAAUAUCUA	GCUGUACC
585	GAAGUAGG	CUGAUGA	X	GAA	ACAGCUAG	CUAGCUGUA	CCUACUUC
589	CUUUGAAG	CUGAUGA	X	GAA	AGGUACAG	CUGUACCUA	CUUCAAAG
592	CUUCUUUG	CUGAUGA	X	GAA	AGUAGGUA	UACCUACUU	CAAAGAAG
593	UCUUCUUU	CUGAUGA	X	GAA	AAGUAGGU	ACCUACUUC	AAAGAAGA
614	AGAUUGCA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUC	UGCAAUCU
621	AAUAUAUA	CUGAUGA	X	GAA	AUUGCAGA	UCUGCAAUC	UAUAUAUU
623	UAAAUAUA	CUGAUGA	X	GAA	AGAUUGCA	UGCAAUCUA	UAUAUUUA
625	AAUAAAUA	CUGAUGA	X	GAA	AUAGAUUG	CAAUCUAUA	UAUUUAUU
627	CUAAUAAA	CUGAUGA	X	GAA	AUAUAGAU	AUCUAUAUA	UUUAUUAG
629	CACUAAUA	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU	UAUUAGUG
630	UCACUAAU	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUU	AUUAGUGA
631	AUCACUAA	CUGAUGA	X	GAA	AAAUAUAU	AUAUAUUUA	UUAGUGAU

633	GUAUCACU CUGAUGA X GAA AUAAAUAU	AUAUUUAUU AGUGAUAC
634	UGUAUCAC CUGAUGA X GAA AAUAAAUA	UAUUUAUUA GUGAUACA
640	UCUACCUG CUGAUGA X GAA AUCACUAA	UUAGUGAUA CAGGUAGA
646	GAAAGGUC CUGAUGA X GAA ACCUGUAU	AUACAGGUA GACCUUUC
652	CUCUACGA CUGAUGA X GAA AGGUCUAC	GUAGACCUU UCGUAGAG
653	UCUCUACG CUGAUGA X GAA AAGGUCUA	UAGACCUUU CGUAGAGA
654	AUCUCUAC CUGAUGA X GAA AAAGGUCU	AGACCUUUC GUAGAGAU
657	UACAUCUC CUGAUGA X GAA ACGAAAGG	CCUUUCGUA GAGAUGUA
665	UUUCACUG CUGAUGA X GAA ACAUCUCU	AGAGAUGUA CAGUGAAA
675	AUUUCGGG CUGAUGA X GAA AUUUCACU	AGUGAAAUC CCCGAAAU
684	AUGUGUAU CUGAUGA X GAA AUUUCGGG	CCCGAAAUU AUACACAU
685	CAUGUGUA CUGAUGA X GAA AAUUUCGG	CCGAAAUUA UACACAUG
687	GUCAUGUG CUGAUGA X GAA AUAAUUUC	GAAAUUAUA CACAUGAC
711	GGAAUGAC CUGAUGA X GAA AGCUCCCU	AGGGAGCUC GUCAUUCC
714	CAGGGAAU CUGAUGA X GAA ACGAGCUC	GAGCUCGUC AUUCCCUG
717	CGGCAGGG CUGAUGA X GAA AUGACGAG	CUCGUCAUU CCCUGCCG
718	CCGGCAGG CUGAUGA X GAA AAUGACGA	UCGUCAUUC CCUGCCGG
729	GGUGACGU CUGAUGA X GAA ACCCGGCA	UGCCGGGUU ACGUCACC
730	AGGUGACG CUGAUGA X GAA AACCCGGC	GCCGGGUUA CGUCACCU
734	UGUUAGGU CUGAUGA X GAA ACGUAACC	GGUUACGUC ACCUAACA
739	AGUGAUGU CUGAUGA X GAA AGGUGACG	CGUCACCUA ACAUCACU
744	GUAACAGU CUGAUGA X GAA AUGUUAGG	CCUAACAUC ACUGUUAC
750	UUUAAAGU CUGAUGA X GAA ACAGUGAU	AUCACUGUU ACUUUAAA
751	UUUUAAAG CUGAUGA X GAA AACAGUGA	UCACUGUUA CUUUAAAA
754	CUUUUUUA CUGAUGA X GAA AGUAACAG	CUGUUACUU UAAAAAAG
755	ACUUUUUU CUGAUGA X GAA AAGUAACA	UGUUACUUU AAAAAAGU
756	AACUUUUU CUGAUGA X GAA AAAGUAAC	GUUACUUUA AAAAAGUU
764	CAAGUGGA CUGAUGA X GAA ACUUUUUU	AAAAAAGUU UCCACUUG
765	UCAAGUGG CUGAUGA X GAA AACUUUUU	AAAAAGUUU CCACUUGA
766	GUCAAGUG CUGAUGA X GAA AAACUUUU	AAAAGUUUC CACUUGAC
771	AAAGUGUC CUGAUGA X GAA AGUGGAAA	UUUCCACUU GACACUUU
778	AGGGAUCA CUGAUGA X GAA AGUGUCAA	UUGACACUU UGAUCCCU
779	CAGGGAUC CUGAUGA X GAA AAGUGUCA	UGACACUUU GAUCCCUG

783	CCAUCAGG	CUGAUGA	X	GAA	AUCAAAGU	ACUUUGAUC	CCUGAUGG
801	UCCCAGAU	CUGAUGA	X	GAA	AUGCGUUU	AAACGCAUA	AUCUGGGA
804	CUGUCCCA	CUGAUGA	X	GAA	AUUAUGCG	CGCAUAAUC	UGGGACAG
814	GCCCUUUC	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUA	GAAAGGGC
824	AUAUGAUG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU	CAUCAUAU
825	GAUAUGAU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC	AUCAUAUC
828	UUUGAUAU	CUGAUGA	X	GAA	AUGAAGCC	GGCUUCAUC	AUAUCAAA
831	GCAUUUGA	CUGAUGA	X	GAA	AUGAUGAA	UUCAUCAUA	UCAAAUGC
833	UUGCAUUU	CUGAUGA	X	GAA	AUAUGAUG	CAUCAUAUC	AAAUGCAA
845	UUUCUUUG	CUGAUGA	X	GAA	ACGUUGCA	UGCAACGUA	CAAAGAAA
855	AGAAGCCC	CUGAUGA	X	GAA	AUUUCUUU	AAAGAAAUA	GGGCUUCU
861	CAGGUCAG	CUGAUGA	X	GAA	AGCCCUAU	AUAGGGCUU	CUGACCUG
862	ACAGGUCA	CUGAUGA	X	GAA	AAGCCCUA	UAGGGCUUC	UGACCUGU
882	UGCCCAUU	CUGAUGA	X	GAA	ACUGUUGC	GCAACAGUC	AAUGGGCA
892	CUUAUACA	CUGAUGA	X	GAA	AUGCCCAU	AUGGGCAUU	UGUAUAAG
893	UCUUAUAC	CUGAUGA	X	GAA	AAUGCCCA	UGGGCAUUU	GUAUAAGA
896	UUGUCUUA	CUGAUGA	X	GAA	ACAAAUGC	GCAUUUGUA	UAAGACAA
898	GUUUGUCU	CUGAUGA	X	GAA	AUACAAAU	AUUUGUAUA	AGACAAAC
908	GUGUGAGA	CUGAUGA	X	GAA	AGUUUGUC	GACAAACUA	UCUCACAC
910	AUGUGUGA	CUGAUGA	X	GAA	AUAGUUUG	CAAACUAUC	UCACACAU
912	CGAUGUGU	CUGAUGA	X	GAA	AGAUAGUU	AACUAUCUC	ACACAUCG
919	GGUUUGUC	CUGAUGA	X	GAA	AUGUGUGA	UCACACAUC	GACAAACC
931	UAUGAUUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUA	CAAUCAUA
936	ACAUCUAU	CUGAUGA	X	GAA	AUUGUAUU	AAUACAAUC	AUAGAUGU
939	UGGACAUC	CUGAUGA	X	GAA	AUGAUUGU	ACAAUCAUA	GAUGUCCA
945	CUUAUUUG	CUGAUGA	X	GAA	ACAUCUAU	AUAGAUGUC	CAAAUAAG
951	GGUGUGCU	CUGAUGA	X	GAA	AUUUGGAC	GUCCAAAUA	AGCACACC
969	AGUAAUUU	CUGAUGA	X	GAA	ACUGGGCG	CGCCCAGUC	AAAUUACU
974	CUCUAAGU	CUGAUGA	X	GAA	AUUUGACU	AGUCAAAUU	ACUUAGAG
975	CCUCUAAG	CUGAUGA	X	GAA	AAUUUGAC	GUCAAAUUA	CUUAGAGG
978	UGGCCUCU	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	AGAGGCCA
979	AUGGCCUC	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUA	GAGGCCAU
988	GACAAGAG	CUGAUGA	X	GAA	AUGGCCUC	GAGGCCAUA	CUCUUGUC

991	GAGGACAA CUGAUGA X GAA AGUAUGGC	GCCAUACUC UUGUCCUC
993	UUGAGGAC CUGAUGA X GAA AGAGUAUG	CAUACUCUU GUCCUCAA
996	CAAUUGAG CUGAUGA X GAA ACAAGAGU	ACUCUUGUC CUCAAUUG
999	GUACAAUU CUGAUGA X GAA AGGACAAG	CUUGUCCUC AAUUGUAC
1003	AGCAGUAC CUGAUGA X GAA AUUGAGGA	UCCUCAAUU GUACUGCU
1006	GGUAGCAG CUGAUGA X GAA ACAAUUGA	UCAAUUGUA CUGCUACC
1012	GGGAGUGG CUGAUGA X GAA AGCAGUAC	GUACUGCUA CCACUCCC
1018	GUUCAAGG CUGAUGA X GAA AGUGGUAG	CUACCACUC CCUUGAAC
1022	UCGUGUUC CUGAUGA X GAA AGGGAGUG	CACUCCCUU GAACACGA
1035	GUCAUUUG CUGAUGA X GAA ACUCUCGU	ACGAGAGUU CAAAUGAC
1036	GGUCAUUU CUGAUGA X GAA AACUCUCG	CGAGAGUUC AAAUGACC
1051	AUCAGGGU CUGAUGA X GAA ACUCCAGG	CCUGGAGUU ACCCUGAU
1052	CAUCAGGG CUGAUGA X GAA AACUCCAG	CUGGAGUUA CCCUGAUG
1069	AGCUCUCU CUGAUGA X GAA AUUUUUUU	AAAAAAAUA AGAGAGCU
1078	CCUUACGG CUGAUGA X GAA AGCUCUCU	AGAGAGCUU CCGUAAGG
1079	GCCUUACG CUGAUGA X GAA AAGCUCUC	GAGAGCUUC CGUAAGGC
1083	CGUCGCCU CUGAUGA X GAA ACGGAAGC	GCUUCCGUA AGGCGACG
1095	CUUUGGUC CUGAUGA X GAA AUUCGUCG	CGACGAAUU GACCAAAG
1108	GGCAUGGG CUGAUGA X GAA AUUGCUUU	AAAGCAAUU CCCAUGCC
1109	UGGCAUGG CUGAUGA X GAA AAUUGCUU	AAGCAAUUC CCAUGCCA
1122	CUGUAGAA CUGAUGA X GAA AUGUUGGC	GCCAACAUA UUCUACAG
1124	CACUGUAG CUGAUGA X GAA AUAUGUUG	CAACAUAUU CUACAGUG
1125	ACACUGUA CUGAUGA X GAA AAUAUGUU	AACAUAUUC UACAGUGU
1127	GAACACUG CUGAUGA X GAA AGAAUAUG	CAUAUUCUA CAGUGUUC
1134	AUAGUAAG CUGAUGA X GAA ACACUGUA	UACAGUGUU CUUACUAU
1135	AAUAGUAA CUGAUGA X GAA AACACUGU	ACAGUGUUC UUACUAUU
1137	UCAAUAGU CUGAUGA X GAA AGAACACU	AGUGUUCUU ACUAUUGA
1138	GUCAAUAG CUGAUGA X GAA AAGAACAC	GUGUUCUUA CUAUUGAC
1141	UUUGUCAA CUGAUGA X GAA AGUAAGAA	UUCUUACUA UUGACAAA
1143	AUUUUGUC CUGAUGA X GAA AUAGUAAG	CUUACUAUU GACAAAAU
1173	CAAGUAUA CUGAUGA X GAA AGUCCUUU	AAAGGACUU UAUACUUG
1174	ACAAGUAU CUGAUGA X GAA AAGUCCUU	AAGGACUUU AUACUUGU
1175	GACAAGUA CUGAUGA X GAA AAAGUCCU	AGGACUUUA UACUUGUC

1177	ACGACAAG	CUGAUGA X GAA	AUAAAGUC	GACUUUAUA CUUGUCGU
1180	UACACGAC	CUGAUGA X GAA	AGUAUAAA	UUUAUACUU GUCGUGUA
1183	CCUUACAC	CUGAUGA X GAA	ACAAGUAU	AUACUUGUC GUGUAAGG
1188	CCACUCCU	CUGAUGA X GAA	ACACGACA	UGUCGUGUA AGGAGUGG
1202	AUUUGAAU	CUGAUGA X GAA	AUGGUCCA	UGGACCAUC AUUCAAAU
1205	CAGAUUUG	CUGAUGA X GAA	AUGAUGGU	ACCAUCAUU CAAAUCUG
1206	ACAGAUUU	CUGAUGA X GAA	AAUGAUGG	CCAUCAUUC AAAUCUGU
1211	UGUUAACA	CUGAUGA X GAA	AUUUGAAU	AUUCAAAUC UGUUAACA
1215	GAGGUGUU	CUGAUGA X GAA	ACAGAUUU	AAAUCUGUU AACACCUC
1216	UGAGGUGU	CUGAUGA X GAA	AACAGAUU	AAUCUGUUA ACACCUCA
1223	UAUGCACU	CUGAUGA X GAA	AGGUGUUA	UAACACCUC AGUGCAUA
1231	AUCAUAUA	CUGAUGA X GAA	AUGCACUG	CAGUGCAUA UAUAUGAU
1233	UUAUCAUA	CUGAUGA X GAA	AUAUGCAC	GUGCAUAUA UAUGAUAA
1235	CUUUAUCA	CUGAUGA X GAA	AUAUAUGC	GCAUAUAUA UGAUAAAG
1240	GAAUGCUU	CUGAUGA X GAA	AUCAUAUA	UAUAUGAUA AAGCAUUC
1247	CAGUGAUG	CUGAUGA X GAA	AUGCUUUA	UAAAGCAUU CAUCACUG
1248	ACAGUGAU	CUGAUGA X GAA	AAUGCUUU	AAAGCAUUC AUCACUGU
1251	UUCACAGU	CUGAUGA X GAA	AUGAAUGC	GCAUUCAUC ACUGUGAA
1264	CUGUUUUC	CUGAUGA X GAA	AUGUUUCA	UGAAACAUC GAAAACAG
1281	ACGGUUUC	CUGAUGA X GAA	AGCACCUG	CAGGUGCUU GAAACCGU
1290	UUGCCAGC	CUGAUGA X GAA	ACGGUUUC	GAAACCGUA GCUGGCAA
1304	GCCGGUAA	CUGAUGA X GAA	ACCGCUUG	CAAGCGGUC UUACCGGC
1306	GAGCCGGU	CUGAUGA X GAA	AGACCGCU	AGCGGUCUU ACCGGCUC
1307	AGAGCCGG	CUGAUGA X GAA	AAGACCGC	GCGGUCUUA CCGGCUCU
1314	UUCAUAGA	CUGAUGA X GAA	AGCCGGUA	UACCGGCUC UCUAUGAA
1316	CUUUCAUA	CUGAUGA X GAA	AGAGCCGG	CCGGCUCUC UAUGAAAG
1318	CACUUUCA	CUGAUGA X GAA	AGAGAGCC	GGCUCUCUA UGAAAGUG
1334	GCGAGGGA	CUGAUGA X GAA	AUGCCUUC	GAAGGCAUU UCCCUCGC
1335	GGCGAGGG	CUGAUGA X GAA	AAUGCCUU	AAGGCAUUU CCCUCGCC
1336	CGGCGAGG	CUGAUGA X GAA	AAAUGCCU	AGGCAUUUC CCUCGCCG
1340	CUUCCGGC	CUGAUGA X GAA	AGGGAAAU	AUUUCCCUC GCCGGAAG
1350	AACCAUAC	CUGAUGA X GAA	ACUUCCGG	CCGGAAGUU GUAUGGUU
1353	UUUAACCA	CUGAUGA X GAA	ACAACUUC	GAAGUUGUA UGGUUAAA

1358	CAUCUUUU CUGAUGA X GAA ACCAUACA	UGUAUGGUU AAAAGAUG
1359	CCAUCUUU CUGAUGA X GAA AACCAUAC	GUAUGGUUA AAAGAUGG
1370	UCGCAGGU CUGAUGA X GAA ACCCAUCU	AGAUGGGUU ACCUGCGA
1371	GUCGCAGG CUGAUGA X GAA AACCCAUC	GAUGGGUUA CCUGCGAC
1388	AGCGAGCA CUGAUGA X GAA AUUUCUCA	UGAGAAAUC UGCUCGCU
1393	CAAAUAGC CUGAUGA X GAA AGCAGAUU	AAUCUGCUC GCUAUUUG
1397	GAGUCAAA CUGAUGA X GAA AGCGAGCA	UGCUCGCUA UUUGACUC
1399	ACGAGUCA CUGAUGA X GAA AUAGCGAG	CUCGCUAUU UGACUCGU
1400	CACGAGUC CUGAUGA X GAA AAUAGCGA	UCGCUAUUU GACUCGUG
1405	GUAGCCAC CUGAUGA X GAA AGUCAAAU	AUUUGACUC GUGGCUAC
1412	UUAACGAG CUGAUGA X GAA AGCCACGA	UCGUGGCUA CUCGUUAA
1415	UAAUUAAC CUGAUGA X GAA AGUAGCCA	UGGCUACUC GUUAAUUA
1418	UGAUAAUU CUGAUGA X GAA ACGAGUAG	CUACUCGUU AAUUAUCA
1419	UUGAUAAU CUGAUGA X GAA AACGAGUA	UACUCGUUA AUUAUCAA
1422	UCCUUGAU CUGAUGA X GAA AUUAACGA	UCGUUAAUU AUCAAGGA
1423	GUCCUUGA CUGAUGA X GAA AAUUAACG	CGUUAAUUA UCAAGGAC
1425	ACGUCCUU CUGAUGA X GAA AUAAUUAA	UUAAUUAUC AAGGACGU
1434	UCUUCAGU CUGAUGA X GAA ACGUCCUU	AAGGACGUA ACUGAAGA
1456	GAUUGUAU CUGAUGA X GAA AUUCCCUG	CAGGGAAUU AUACAAUC
1457	AGAUUGUA CUGAUGA X GAA AAUUCCCU	AGGGAAUUA UACAAUCU
1459	CAAGAUUG CUGAUGA X GAA AUAAUUCC	GGAAUUAUA CAAUCUUG
1464	CUCAGCAA CUGAUGA X GAA AUUGUAUA	UAUACAAUC UUGCUGAG
1466	UGCUCAGC CUGAUGA X GAA AGAUUGUA	UACAAUCUU GCUGAGCA
1476	GACUGUUU CUGAUGA X GAA AUGCUCAG	CUGAGCAUA AAACAGUC
1484	ACACAUUU CUGAUGA X GAA ACUGUUUU	AAAACAGUC AAAUGUGU
1493	GGUUUUUA CUGAUGA X GAA ACACAUUU	AAAUGUGUU UAAAAACC
1494	AGGUUUUU CUGAUGA X GAA AACACAUU	AAUGUGUUU AAAAACCU
1495	GAGGUUUU CUGAUGA X GAA AAACACAU	AUGUGUUUA AAAACCUC
1503	GUGGCAGU CUGAUGA X GAA AGGUUUUU	AAAAACCUC ACUGCCAC
1513	GACAAUUA CUGAUGA X GAA AGUGGCAG	CUGCCACUC UAAUUGUC
1515	UUGACAAU CUGAUGA X GAA AGAGUGGC	GCCACUCUA AUUGUCAA
1518	ACAUUGAC CUGAUGA X GAA AUUAGAGU	ACUCUAAUU GUCAAUGU
1521	UUCACAUU CUGAUGA X GAA ACAAUUAG	CUAAUUGUC AAUGUGAA

1539	UUUUCGUA CUGAUGA X GAA AUCUGGGG	CCCCAGAUU UACGAAAA
1540	CUUUUCGU CUGAUGA X GAA AAUCUGGG	CCCAGAUUU ACGAAAAG
1541	CCUUUUCG CUGAUGA X GAA AAAUCUGG	CCAGAUUUA CGAAAAGG
1556	GAAACGAU CUGAUGA X GAA ACACGGCC	GGCCGUGUC AUCGUUUC
1559	CUGGAAAC CUGAUGA X GAA AUGACACG	CGUGUCAUC GUUUCCAG
1562	GGUCUGGA CUGAUGA X GAA ACGAUGAC	GUCAUCGUU UCCAGACC
1563	GGGUCUGG CUGAUGA X GAA AACGAUGA	UCAUCGUUU CCAGACCC
1564	CGGGUCUG CUGAUGA X GAA AAACGAUG	CAUCGUUUC CAGACCCG
1576	UGGGUAGA CUGAUGA X GAA AGCCGGGU	ACCCGGCUC UCUACCCA
1578	AGUGGGUA CUGAUGA X GAA AGAGCCGG	CCGGCUCUC UACCCACU
1580	CCAGUGGG CUGAUGA X GAA AGAGAGCC	GGCUCUCUA CCCACUGG
1602	CAAGUCAG CUGAUGA X GAA AUUUGUCU	AGACAAAUC CUGACUUG
1609	UGCGGUAC CUGAUGA X GAA AGUCAGGA	UCCUGACUU GUACCGCA
1612	AUAUGCGG CUGAUGA X GAA ACAAGUCA	UGACUUGUA CCGCAUAU
1619	GGAUACCA CUGAUGA X GAA AUGCGGUA	UACCGCAUA UGGUAUCC
1624	UUGAGGGA CUGAUGA X GAA ACCAUAUG	CAUAUGGUA UCCCUCAA
1626	GGUUGAGG CUGAUGA X GAA AUACCAUA	UAUGGUAUC CCUCAACC
1630	UGUAGGUU CUGAUGA X GAA AGGGAUAC	GUAUCCCUC AACCUACA
1636	CUUGAUUG CUGAUGA X GAA AGGUUGAG	CUCAACCUA CAAUCAAG
1641	AACCACUU CUGAUGA X GAA AUUGUAGG	CCUACAAUC AAGUGGUU
1649	GGUGCCAG CUGAUGA X GAA ACCACUUG	CAAGUGGUU CUGGCACC
1650	GGGUGCCA CUGAUGA X GAA AACCACUU	AAGUGGUUC UGGCACCC
1663	AUUAUGGU CUGAUGA X GAA ACAGGGGU	ACCCCUGUA ACCAUAAU
1669	GGAAUGAU CUGAUGA X GAA AUGGUUAC	GUAACCAUA AUCAUUCC
1672	UUCGGAAU CUGAUGA X GAA AUUAUGGU	ACCAUAAUC AUUCCGAA
1675	UGCUUCGG CUGAUGA X GAA AUGAUUAU	AUAAUCAUU CCGAAGCA
1676	UUGCUUCG CUGAUGA X GAA AAUGAUUA	UAAUCAUUC CGAAGCAA
1694	UGGAACAA CUGAUGA X GAA AGUCACAC	GUGUGACUU UUGUUCCA
1695	UUGGAACA CUGAUGA X GAA AAGUCACA	UGUGACUUU UGUUCCAA
1696	AUUGGAAC CUGAUGA X GAA AAAGUCAC	GUGACUUUU GUUCCAAU
1699	AUUAUUGG CUGAUGA X GAA ACAAAAGU	ACUUUUGUU CCAAUAAU
1700	CAUUAUUG CUGAUGA X GAA AACAAAAG	CUUUUGUUC CAAUAAUG
1705	CUCUUCAU CUGAUGA X GAA AUUGGAAC	GUUCCAAUA AUGAAGAG

1715	GGAUAAAG	CUGAUGA	X	GAA	ACUCUUCA	UGAAGAGUC CUUUAUCC
1718	CCAGGAUA	CUGAUGA	X	GAA	AGGACUCU	AGAGUCCUU UAUCCUGG
1719	UCCAGGAU	CUGAUGA	X	GAA	AAGGACUC	GAGUCCUUU AUCCUGGA
1720	AUCCAGGA	CUGAUGA	X	GAA	AAAGGACU	AGUCCUUUA UCCUGGAU
1722	GCAUCCAG	CUGAUGA	X	GAA	AUAAAGGA	UCCUUUAUC CUGGAUGC
1755	AUGCUCUC	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU GAGAGCAU
1764	CGCUGAGU	CUGAUGA	X	GAA	AUGCUCUC	GAGAGCAUC ACUCAGCG
1768	CAUGCGCU	CUGAUGA	X	GAA	AGUGAUGC	GCAUCACUC AGCGCAUG
1782	CCUUCUAU	CUGAUGA	X	GAA	AUUGCCAU	AUGGCAAUA AUAGAAGG
1785	UUUCCUUC	CUGAUGA	X	GAA	AUUAUUGC	GCAAUAAUA GAAGGAAA
1798	AGCCAUCU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUA AGAUGGCU
1807	CAAGGUGC	CUGAUGA	X	GAA	AGCCAUCU	AGAUGGCUA GCACCUUG
1814	CCACAACC	CUGAUGA	X	GAA	AGGUGCUA	UAGCACCUU GGUUGUGG
1818	UCAGCCAC	CUGAUGA	X	GAA	ACCAAGGU	ACCUUGGUU GUGGCUGA
1829	AAAUUCUA	CUGAUGA	X	GAA	AGUCAGCC	GGCUGACUC UAGAAUUU
1831	AGAAAUUC	CUGAUGA	X	GAA	AGAGUCAG	CUGACUCUA GAAUUUCU
1836	AUUCCAGA	CUGAUGA	X	GAA	AUUCUAGA	UCUAGAAUU UCUGGAAU
1837	GAUUCCAG	CUGAUGA	X	GAA	AAUUCUAG	CUAGAAUUU CUGGAAUC
1838	AGAUUCCA	CUGAUGA	X	GAA	AAAUUCUA	UAGAAUUUC UGGAAUCU
1845	CAAAUGUA	CUGAUGA	X	GAA	AUUCCAGA	UCUGGAAUC UACAUUUG
1847	UGCAAAUG	CUGAUGA	X	GAA	AGAUUCCA	UGGAAUCUA CAUUUGCA
1851	GCUAUGCA	CUGAUGA	X	GAA	AUGUAGAU	AUCUACAUU UGCAUAGC
1852	AGCUAUGC	CUGAUGA	X	GAA	AAUGUAGA	UCUACAUUU GCAUAGCU
1857	UUGGAAGC	CUGAUGA	X	GAA	AUGCAAAU	AUUUGCAUA GCUUCCAA
1861	UUUAUUGG	CUGAUGA	X	GAA	AGCUAUGC	GCAUAGCUU CCAAUAAA
1862	CUUUAUUG	CUGAUGA	X	GAA	AAGCUAUG	CAUAGCUUC CAAUAAAG
1867	CCCAACUU	CUGAUGA	X	GAA	AUUGGAAG	CUUCCAAUA AAGUUGGG
1872	ACAGUCCC	CUGAUGA	X	GAA	ACUUUAUU	AAUAAAGUU GGGACUGU
1893	UAAAAGCU	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUA AGCUUUUA
1898	UGAUAUAA	CUGAUGA	X	GAA	AGCUUAUG	CAUAAGCUU UUAUAUCA
1899	GUGAUAUA	CUGAUGA	X	GAA	AAGCUUAU	AUAAGCUUU UAUAUCAC
1900	UGUGAUAU	CUGAUGA	X	GAA	AAAGCUUA	UAAGCUUUU AUAUCACA
1901	CUGUGAUA	CUGAUGA	X	GAA	AAAAGCUU	AAGCUUUUA UAUCACAG

1903	AUCUGUGA	CUGAUGA	X	GAA	AUAAAAGC	GCUUUUAUA UCACAGAU
1905	ACAUCUGU	CUGAUGA	X	GAA	AUAUAAAA	UUUUAUAUC ACAGAUGU
1925	UAACAUGA	CUGAUGA	X	GAA	ACCCAUUU	AAAUGGGUU UCAUGUUA
1926	UUAACAUG	CUGAUGA	X	GAA	AACCCAUU	AAUGGGUUU CAUGUUAA
1927	GUUAACAU	CUGAUGA	X	GAA	AAACCCAU	AUGGGUUUC AUGUUAAC
1932	UCCAAGUU	CUGAUGA	X	GAA	ACAUGAAA	UUUCAUGUU AACUUGGA
1933	UUCCAAGU	CUGAUGA	X	GAA	AACAUGAA	UUCAUGUUA ACUUGGAA
1937	UUUUUUCC	CUGAUGA	X	GAA	AGUUAACA	UGUUAACUU GGAAAAAA
1976	CUGUGCAA	CUGAUGA	X	GAA	ACAGUUUC	GAAACUGUC UUGCACAG
1978	AACUGUGC	CUGAUGA	X	GAA	AGACAGUU	AACUGUCUU GCACAGUU
1986	AACUUGUU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU AACAAGUU
1987	GAACUUGU	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA ACAAGUUC
1994	UGUAUAAG	CUGAUGA	X	GAA	ACUUGUUA	UAACAAGUU CUUAUACA
1995	CUGUAUAA	CUGAUGA	X	GAA	AACUUGUU	AACAAGUUC UUAUACAG
1997	CUCUGUAU	CUGAUGA	X	GAA	AGAACUUG	CAAGUUCUU AUACAGAG
1998	UCUCUGUA	CUGAUGA	X	GAA	AAGAACUU	AAGUUCUUA UACAGAGA
2000	CGUCUCUG	CUGAUGA	X	GAA	AUAAGAAC	GUUCUUAUA CAGAGACG
2010	AUCCAAGU	CUGAUGA	X	GAA	ACGUCUCU	AGAGACGUU ACUUGGAU
2011	AAUCCAAG	CUGAUGA	X	GAA	AACGUCUC	GAGACGUUA CUUGGAUU
2014	UAAAAUCC	CUGAUGA	X	GAA	AGUAACGU	ACGUUACUU GGAUUUUA
2019	CGCAGUAA	CUGAUGA	X	GAA	AUCCAAGU	ACUUGGAUU UUACUGCG
2020	CCGCAGUA	CUGAUGA	X	GAA	AAUCCAAG	CUUGGAUUU UACUGCGG
2021	UCCGCAGU	CUGAUGA	X	GAA	AAAUCCAA	UUGGAUUUU ACUGCGGA
2022	GUCCGCAG	CUGAUGA	X	GAA	AAAAUCCA	UGGAUUUUA CUGCGGAC
2034	CUGUUAUU	CUGAUGA	X	GAA	ACUGUCCG	CGGACAGUU AAUAACAG
2035	UCUGUUAU	CUGAUGA	X	GAA	AACUGUCC	GGACAGUUA AUAACAGA
2038	UGUUCUGU	CUGAUGA	X	GAA	AUUAACUG	CAGUUAAUA ACAGAACA
2054	UAAUACUG	CUGAUGA	X	GAA	AGUGCAUU	AAUGCACUA CAGUAUUA
2059	CUUGCUAA	CUGAUGA	X	GAA	ACUGUAGU	ACUACAGUA UUAGCAAG
2061	UGCUUGCU	CUGAUGA	X	GAA	AUACUGUA	UACAGUAUU AGCAAGCA
2062	UUGCUUGC	CUGAUGA	X	GAA	AAUACUGU	ACAGUAUUA GCAAGCAA
2082	UCCUUAGU	CUGAUGA	X	GAA	AUGGCCAU	AUGGCCAUC ACUAAGGA
2086	GUGCUCCU	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA AGGAGCAC

2096	GAGUGAUG CUGAUGA X GAA AGUGCUCC	GGAGCACUC CAUCACUC
2100	UUAAGAGU CUGAUGA X GAA AUGGAGUG	CACUCCAUC ACUCUUAA
2104	AAGAUUAA CUGAUGA X GAA AGUGAUGG	CCAUCACUC UUAAUCUU
2106	GUAAGAUU CUGAUGA X GAA AGAGUGAU	AUCACUCUU AAUCUUAC
2107	GGUAAGAU CUGAUGA X GAA AAGAGUGA	UCACUCUUA AUCUUACC
2110	GAUGGUAA CUGAUGA X GAA AUUAAGAG	CUCUUAAUC UUACCAUC
2112	AUGAUGGU CUGAUGA X GAA AGAUUAAG	CUUAAUCUU ACCAUCAU
2113	CAUGAUGG CUGAUGA X GAA AAGAUUAA	UUAAUCUUA CCAUCAUG
2118	ACAUUCAU CUGAUGA X GAA AUGGUAAG	CUUACCAUC AUGAAUGU
2127	UGCAGGGA CUGAUGA X GAA ACAUUCAU	AUGAAUGUU UCCCUGCA
2128	UUGCAGGG CUGAUGA X GAA AACAUUCA	UGAAUGUUU CCCUGCAA
2129	CUUGCAGG CUGAUGA X GAA AAACAUUC	GAAUGUUUC CCUGCAAG
2140	GGUGCCUG CUGAUGA X GAA AUCUUGCA	UGCAAGAUU CAGGCACC
2141	AGGUGCCU CUGAUGA X GAA AAUCUUGC	GCAAGAUUC AGGCACCU
2150	UGCAGGCA CUGAUGA X GAA AGGUGCCU	AGGCACCUA UGCCUGCA
2172	CCUGUGUA CUGAUGA X GAA ACAUUCCU	AGGAAUGUA UACACAGG
2174	CCCCUGUG CUGAUGA X GAA AUACAUUC	GAAUGUAUA CACAGGGG
2190	UUCUGGAG CUGAUGA X GAA AUUUCUUC	GAAGAAAUC CUCCAGAA
2193	UUCUUCUG CUGAUGA X GAA AGGAUUUC	GAAAUCCUC CAGAAGAA
2208	CUGAUUGU CUGAUGA X GAA AUUUCUUU	AAAGAAAUU ACAAUCAG
2209	UCUGAUUG CUGAUGA X GAA AAUUUCUU	AAGAAAUUA CAAUCAGA
2214	UGAUCUCU CUGAUGA X GAA AUUGUAAU	AUUACAAUC AGAGAUCA
2221	UGCUUCCU CUGAUGA X GAA AUCUCUGA	UCAGAGAUC AGGAAGCA
2234	GCAGGAGG CUGAUGA X GAA AUGGUGCU	AGCACCAUA CCUCCUGC
2238	UUUCGCAG CUGAUGA X GAA AGGUAUGG	CCAUACCUC CUGCGAAA
2250	UGAUCACU CUGAUGA X GAA AGGUUUCG	CGAAACCUC AGUGAUCA
2257	CACUGUGU CUGAUGA X GAA AUCACUGA	UCAGUGAUC ACACAGUG
2271	GAACUGCU CUGAUGA X GAA AUGGCCAC	GUGGCCAUC AGCAGUUC
2278	AGUGGUGG CUGAUGA X GAA ACUGCUGA	UCAGCAGUU CCACCACU
2279	AAGUGGUG CUGAUGA X GAA AACUGCUG	CAGCAGUUC CACCACUU
2287	ACAGUCUA CUGAUGA X GAA AGUGGUGG	CCACCACUU UAGACUGU
2288	GACAGUCU CUGAUGA X GAA AAGUGGUG	CACCACUUU AGACUGUC
2289	UGACAGUC CUGAUGA X GAA AAAGUGGU	ACCACUUUA GACUGUCA

2296	AUUAGCAU	CUGAUGA	X	GAA	ACAGUCUA	UAGACUGUC	AUGCUAAU
2302	GACACCAU	CUGAUGA	X	GAA	AGCAUGAC	GUCAUGCUA	AUGGUGUC
2310	GGCUCGGG	CUGAUGA	X	GAA	ACACCAUU	AAUGGUGUC	CCCGAGCC
2320	AGUGAUCU	CUGAUGA	X	GAA	AGGCUCGG	CCGAGCCUC	AGAUCACU
2325	AACCAAGU	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAUC	ACUUGGUU
2329	UUUAAACC	CUGAUGA	X	GAA	AGUGAUCU	AGAUCACUU	GGUUUAAA
2333	UGUUUUUA	CUGAUGA	X	GAA	ACCAAGUG	CACUUGGUU	UAAAAACA
2334	UUGUUUUU	CUGAUGA	X	GAA	AACCAAGU	ACUUGGUUU	AAAAACAA
2335	GUUGUUUU	CUGAUGA	X	GAA	AAACCAAG	CUUGGUUUA	AAAACAAC
2352	UCUUGUUG	CUGAUGA	X	GAA	AUUUUGUG	CACAAAAUA	CAACAAGA
2370	CCUAAAAU	CUGAUGA	X	GAA	AUUCCAGG	CCUGGAAUU	AUUUUAGG
2371	UCCUAAAA	CUGAUGA	X	GAA	AAUUCCAG	CUGGAAUUA	UUUUAGGA
2373	GGUCCUAA	CUGAUGA	X	GAA	AUAAUUCC	GGAAUUAUU	UUAGGACC
2374	UGGUCCUA	CUGAUGA	X	GAA	AAUAAUUC	GAAUUAUUU	UAGGACCA
2375	CUGGUCCU	CUGAUGA	X	GAA	AAAUAAUU	AAUUAUUUU	AGGACCAG
2376	CCUGGUCC	CUGAUGA	X	GAA	AAAAUAAU	AUUAUUUUA	GGACCAGG
2399	UUUCAAUA	CUGAUGA	X	GAA	ACAGCGUG	CACGCUGUU	UAUUGAAA
2400	CUUUCAAU	CUGAUGA	X	GAA	AACAGCGU	ACGCUGUUU	AUUGAAAG
2401	UCUUUCAA	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUA	UUGAAAGA
2403	ACUCUUUC	CUGAUGA	X	GAA	AUAAACAG	CUGUUUAUU	GAAAGAGU
2412	UCUUCUGU	CUGAUGA	X	GAA	ACUCUUUC	GAAAGAGUC	ACAGAAGA
2433	CAGUGAUA	CUGAUGA	X	GAA	ACACCUUC	GAAGGUGUC	UAUCACUG
2435	UGCAGUGA	CUGAUGA	X	GAA	AGACACCU	AGGUGUCUA	UCACUGCA
2437	UUUGCAGU	CUGAUGA	X	GAA	AUAGACAC	GUGUCUAUC	ACUGCAAA
2465	UUUCCACA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUC	UGUGGAAA
2476	GUAUGCUG	CUGAUGA	X	GAA	ACUUUCCA	UGGAAAGUU	CAGCAUAC
2477	GGUAUGCU	CUGAUGA	X	GAA	AACUUUCC	GGAAAGUUC	AGCAUACC
2483	CAGUGAGG	CUGAUGA	X	GAA	AUGCUGAA	UUCAGCAUA	CCUCACUG
2487	UGAACAGU	CUGAUGA	X	GAA	AGGUAUGC	GCAUACCUC	ACUGUUCA
2493	GUUCCUUG	CUGAUGA	X	GAA	ACAGUGAG	CUCACUGUU	CAAGGAAC
2494	GGUUCCUU	CUGAUGA	X	GAA	AACAGUGA	UCACUGUUC	AAGGAACC
2504	ACUUGUCC	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	GGACAAGU
2513	CCAGAUUA	CUGAUGA	X	GAA	ACUUGUCC	GGACAAGUC	UAAUCUGG

2515	CUCCAGAU	CUGAUGA	X	GAA	AGACUUGU	ACAAGUCUA AUCUGGAG
2518	CAGCUCCA	CUGAUGA	X	GAA	AUUAGACU	AGUCUAAUC UGGAGCUG
2529	GUUAGAGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC ACUCUAAC
2533	GCAUGUUA	CUGAUGA	X	GAA	AGUGAUCA	UGAUCACUC UAACAUGC
2535	GUGCAUGU	CUGAUGA	X	GAA	AGAGUGAU	AUCACUCUA ACAUGCAC
2560	CCAGAAGA	CUGAUGA	X	GAA	AGUCGCAG	CUGCGACUC UCUUCUGG
2562	AGCCAGAA	CUGAUGA	X	GAA	AGAGUCGC	GCGACUCUC UUCUGGCU
2564	GGAGCCAG	CUGAUGA	X	GAA	AGAGAGUC	GACUCUCUU CUGGCUCC
2565	AGGAGCCA	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC UGGCUCCU
2571	GUUAAUAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUC CUAUUAAC
2574	AGGGUUAA	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUA UUAACCCU
2576	GGAGGGUU	CUGAUGA	X	GAA	AUAGGAGC	GCUCCUAUU AACCCUCC
2577	AGGAGGGU	CUGAUGA	X	GAA	AAUAGGAG	CUCCUAUUA ACCCUCCU
2583	CGGAUAAG	CUGAUGA	X	GAA	AGGGUUAA	UUAACCCUC CUUAUCCG
2586	UUUCGGAU	CUGAUGA	X	GAA	AGGAGGGU	ACCCUCCUU AUCCGAAA
2587	UUUUCGGA	CUGAUGA	X	GAA	AAGGAGGG	CCCUCCUUA UCCGAAAA
2589	AUUUUUCG	CUGAUGA	X	GAA	AUAAGGAG	CUCCUUAUC CGAAAAAU
2606	CAGAAGAA	CUGAUGA	X	GAA	ACCUUUUC	GAAAAGGUC UUCUUCUG
2608	UUCAGAAG	CUGAUGA	X	GAA	AGACCUUU	AAAGGUCUU CUUCUGAA
2609	UUUCAGAA	CUGAUGA	X	GAA	AAGACCUU	AAGGUCUUC UUCUGAAA
2611	UAUUUCAG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU CUGAAAUA
2612	UUAUUUCA	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC UGAAAUAA
2619	UCAGUCUU	CUGAUGA	X	GAA	AUUUCAGA	UCUGAAAUA AAGACUGA
2630	UUGAUAGG	CUGAUGA	X	GAA	AGUCAGUC	GACUGACUA CCUAUCAA
2634	AUAAUUGA	CUGAUGA	X	GAA	AGGUAGUC	GACUACCUA UCAAUUAU
2636	UUAUAAUU	CUGAUGA	X	GAA	AUAGGUAG	CUACCUAUC AAUUAUAA
2640	UCCAUUAU	CUGAUGA	X	GAA	AUUGAUAG	CUAUCAAUU AUAAUGGA
2641	GUCCAUUA	CUGAUGA	X	GAA	AAUUGAUA	UAUCAAUUA UAAUGGAC
2643	GGGUCCAU	CUGAUGA	X	GAA	AUAAUUGA	UCAAUUAUA AUGGACCC
2661	UCCAAAGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU CCUUUGGA
2662	AUCCAAAG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC CUUUGGAU
2665	CUCAUCCA	CUGAUGA	X	GAA	AGGAACUU	AAGUUCCUU UGGAUGAG
2666	GCUCAUCC	CUGAUGA	X	GAA	AAGGAACU	AGUUCCUUU GGAUGAGC

2688	UCAUAAGG	CUGAUGA	X	GAA	AGCCGCUC	GAGCGGCUC	CCUUAUGA
2692	GGCAUCAU	CUGAUGA	X	GAA	AGGGAGCC	GGCUCCCUU	AUGAUGCC
2693	UGGCAUCA	CUGAUGA	X	GAA	AAGGGAGC	GCUCCCUUA	UGAUGCCA
2714	CCCGGGCA	CUGAUGA	X	GAA	ACUCCCAC	GUGGGAGUU	UGCCCGGG
2715	UCCCGGGC	CUGAUGA	X	GAA	AACUCCCA	UGGGAGUUU	GCCCGGGA
2730	CCCAGUUU	CUGAUGA	X	GAA	AGUCUCUC	GAGAGACUU	AAACUGGG
2731	GCCCAGUU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUA	AACUGGGC
2744	UUCCAAGU	CUGAUGA	X	GAA	AUUUGCCC	GGGCAAAUC	ACUUGGAA
2748	CCUCUUCC	CUGAUGA	X	GAA	AGUGAUUU	AAAUCACUU	GGAAGAGG
2761	UUUUCCAA	CUGAUGA	X	GAA	AGCCCCUC	GAGGGGCUU	UUGGAAAA
2762	CUUUUCCA	CUGAUGA	X	GAA	AAGCCCCU	AGGGGCUUU	UGGAAAAG
2763	ACUUUUCC	CUGAUGA	X	GAA	AAAGCCCC	GGGGCUUUU	GGAAAAGU
2775	GAUGCUUG	CUGAUGA	X	GAA	ACCACUUU	AAAGUGGUU	CAAGCAUC
2776	UGAUGCUU	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	AAGCAUCA
2783	CAAAUGCU	CUGAUGA	X	GAA	AUGCUUGA	UCAAGCAUC	AGCAUUUG
2789	UAAUGCCA	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUU	UGGCAUUA
2790	UUAAUGCC	CUGAUGA	X	GAA	AAUGCUGA	UCAGCAUUU	GGCAUUAA
2796	GAUUUCUU	CUGAUGA	X	GAA	AUGCCAAA	UUUGGCAUU	AAGAAAUC
2797	UGAUUUCU	CUGAUGA	X	GAA	AAUGCCAA	UUGGCAUUA	AGAAAUCA
2804	ACGUAGGU	CUGAUGA	X	GAA	AUUUCUUA	UAAGAAAUC	ACCUACGU
2809	CCGGCACG	CUGAUGA	X	GAA	AGGUGAUU	AAUCACCUA	CGUGCCGG
2864	GAGCUUUG	CUGAUGA	X	GAA	ACUCGCUG	CAGCGAGUA	CAAAGCUC
2872	AGUCAUCA	CUGAUGA	X	GAA	AGCUUUGU	ACAAAGCUC	UGAUGACU
2886	AAGAUUUU	CUGAUGA	X	GAA	AGCUCAGU	ACUGAGCUA	AAAAUCUU
2892	UGGGUCAA	CUGAUGA	X	GAA	AUUUUUAG	CUAAAAAUC	UUGACCCA
2894	UGUGGGUC	CUGAUGA	X	GAA	AGAUUUUU	AAAAAUCUU	GACCCACA
2904	UGGUGGCC	CUGAUGA	X	GAA	AUGUGGGU	ACCCACAUU	GGCCACCA
2914	CACGUUCA	CUGAUGA	X	GAA	AUGGUGGC	GCCACCAUC	UGAACGUG
2925	AGCAGGUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AACCUGCU
2926	CAGCAGGU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	ACCUGCUG
2962	CACCAUCA	CUGAUGA	X	GAA	AGGCCCUC	GAGGGCCUC	UGAUGGUG
2973	UAUUCAAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUUGAAUA
2976	CAGUAUUC	CUGAUGA	X	GAA	ACAAUCAC	GUGAUUGUU	GAAUACUG

2981	AUUUGCAG	CUGAUGA	X	GAA	AUUCAACA	UGUUGAAUA	CUGCAAAU
2990	GAUUUCCA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUA	UGGAAAUC
2998	GUUGGAGA	CUGAUGA	X	GAA	AUUUCCAU	AUGGAAAUC	UCUCCAAC
3000	UAGUUGGA	CUGAUGA	X	GAA	AGAUUUCC	GGAAAUCUC	UCCAACUA
3002	GGUAGUUG	CUGAUGA	X	GAA	AGAGAUUU	AAAUCUCUC	CAACUACC
3008	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAG	CUCCAACUA	CCUCAAGA
3012	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACCUC	AAGAGCAA
3029	GAAAAAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGACUU	AUUUUUUC
3030	AGAAAAAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACUUA	UUUUUUCU
3032	UGAGAAAA	CUGAUGA	X	GAA	AUAAGUCA	UGACUUAUU	UUUUCUCA
3033	UUGAGAAA	CUGAUGA	X	GAA	AAUAAGUC	GACUUAUUU	UUUCUCAA
3034	GUUGAGAA	CUGAUGA	X	GAA	AAAUAAGU	ACUUAUUUU	UUCUCAAC
3035	UGUUGAGA	CUGAUGA	X	GAA	AAAAUAAG	CUUAUUUUU	UCUCAACA
3036	UUGUUGAG	CUGAUGA	X	GAA	AAAAAUAA	UUAUUUUUU	CUCAACAA
3037	CUUGUUGA	CUGAUGA	X	GAA	AAAAAAUA	UAUUUUUUC	UCAACAAG
3039	UCCUUGUU	CUGAUGA	X	GAA	AGAAAAAA	UUUUUUCUC	AACAAGGA
3057	UCCAUGUG	CUGAUGA	X	GAA	AGUGCUGC	GCAGCACUA	CACAUGGA
3070	UUCUUUCU	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	AGAAAGAA
3120	ACGCUAUC	CUGAUGA	X	GAA	AGUCUUGG	CCAAGACUA	GAUAGCGU
3124	GGUGACGC	CUGAUGA	X	GAA	AUCUAGUC	GACUAGAUA	GCGUCACC
3129	CUGCUGGU	CUGAUGA	X	GAA	ACGCUAUC	GAUAGCGUC	ACCAGCAG
3146	AGCUCGCA	CUGAUGA	X	GAA	AGCUUUCG	CGAAAGCUU	UGCGAGCU
3147	GAGCUCGC	CUGAUGA	X	GAA	AAGCUUUC	GAAAGCUUU	GCGAGCUC
3155	GAAAGCCG	CUGAUGA	X	GAA	AGCUCGCA	UGCGAGCUC	CGGCUUUC
3161	CUUCCUGA	CUGAUGA	X	GAA	AGCCGGAG	CUCCGGCUU	UCAGGAAG
3162	UCUUCCUG	CUGAUGA	X	GAA	AAGCCGGA	UCCGGCUUU	CAGGAAGA
3163	AUCUUCCU	CUGAUGA	X	GAA	AAAGCCGG	CCGGCUUUC	AGGAAGAU
3172	CAGACUUU	CUGAUGA	X	GAA	AUCUUCCU	AGGAAGAUA	AAAGUCUG
3178	AUCACUCA	CUGAUGA	X	GAA	ACUUUUAU	AUAAAAGUC	UGAGUGAU
3189	UCUUCCUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUU	GAGGAAGA
3205	ACCGUCAG	CUGAUGA	X	GAA	AUCCUCCU	AGGAGGAUU	CUGACGGU
3206	AACCGUCA	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAUUC	UGACGGUU
3214	CUUGUAGA	CUGAUGA	X	GAA	ACCGUCAG	CUGACGGUU	UCUACAAG

3215	CCUUGUAG	CUGAUGA	X	GAA	AACCGUCA	UGACGGUUU	CUACAAGG
3216	UCCUUGUA	CUGAUGA	X	GAA	AAACCGUC	GACGGUUUC	UACAAGGA
3218	GCUCCUUG	CUGAUGA	X	GAA	AGAAACCG	CGGUUUCUA	CAAGGAGC
3231	UCCAUAGU	CUGAUGA	X	GAA	AUGGGCUC	GAGCCCAUC	ACUAUGGA
3235	AUCUUCCA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	UGGAAGAU
3244	AGAAAUCA	CUGAUGA	X	GAA	AUCUUCCA	UGGAAGAUC	UGAUUUCU
3249	CUGUAAGA	CUGAUGA	X	GAA	AUCAGAUC	GAUCUGAUU	UCUUACAG
3250	ACUGUAAG	CUGAUGA	X	GAA	AAUCAGAU	AUCUGAUUU	CUUACAGU
3251	AACUGUAA	CUGAUGA	X	GAA	AAAUCAGA	UCUGAUUUC	UUACAGUU
3253	AAAACUGU	CUGAUGA	X	GAA	AGAAAUCA	UGAUUUCUU	ACAGUUUU
3254	GAAAACUG	CUGAUGA	X	GAA	AAGAAAUC	GAUUUCUUA	CAGUUUUC
3259	CACUUGAA	CUGAUGA	X	GAA	ACUGUAAG	CUUACAGUU	UUCAAGUG
3260	CCACUUGA	CUGAUGA	X	GAA	AACUGUAA	UUACAGUUU	UCAAGUGG
3261	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUU	CAAGUGGC
3262	GGCCACUU	CUGAUGA	X	GAA	AAAACUGU	ACAGUUUUC	AAGUGGCC
3284	AAGACAGG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CCUGUCUU
3285	GAAGACAG	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	CUGUCUUC
3290	UUCUGGAA	CUGAUGA	X	GAA	ACAGGAAC	GUUCCUGUC	UUCCAGAA
3292	CUUUCUGG	CUGAUGA	X	GAA	AGACAGGA	UCCUGUCUU	CCAGAAAG
3293	ACUUUCUG	CUGAUGA	X	GAA	AAGACAGG	CCUGUCUUC	CAGAAAGU
3306	UCCCGAUG	CUGAUGA	X	GAA	AUGCACUU	AAGUGCAUU	CAUCGGGA
3307	GUCCCGAU	CUGAUGA	X	GAA	AAUGCACU	AGUGCAUUC	AUCGGGAC
3310	CAGGUCCC	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAUC	GGGACCUG
3333	GAUAAAAG	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUU	CUUUUAUC
3334	AGAUAAAA	CUGAUGA	X	GAA	AAUGUUUC	GAAACAUUC	UUUUAUCU
3336	UCAGAUAA	CUGAUGA	X	GAA	AGAAUGUU	AACAUUCUU	UUAUCUGA
3337	CUCAGAUA	CUGAUGA	X	GAA	AAGAAUGU	ACAUUCUUU	UAUCUGAG
3338	UCUCAGAU	CUGAUGA	X	GAA	AAAGAAUG	CAUUCUUUU	AUCUGAGA
3339	UUCUCAGA	CUGAUGA	X	GAA	AAAAGAAU	AUUCUUUUA	UCUGAGAA
3341	UGUUCUCA	CUGAUGA	X	GAA	AUAAAAGA	UCUUUUAUC	UGAGAACA
3363	AAAUCACA	CUGAUGA	X	GAA	AUCUUCAC	GUGAAGAUU	UGUGAUUU
3364	AAAAUCAC	CUGAUGA	X	GAA	AAUCUUCA	UGAAGAUUU	GUGAUUUU
3370	AAGGCCAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUGGCCUU

3371	CAAGGCCA	CUGAUGA	X	GAA	AAUCACAA	UUGUGAUUU	UGGCCUUG
3372	GCAAGGCC	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	GGCCUUGC
3378	UCCCGGGC	CUGAUGA	X	GAA	AGGCCAAA	UUUGGCCUU	GCCCGGGA
3388	CUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA	UUUAUAAG
3390	UUCUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAGAA
3391	GUUCUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAGAAC
3392	GGUUCUUA	CUGAUGA	X	GAA	AAAUAUCC	GGAUAUUUA	UAAGAACC
3394	GGGGUUCU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUA	AGAACCCC
3406	UCUCACAU	CUGAUGA	X	GAA	AUCGGGGU	ACCCCGAUU	AUGUGAGA
3407	UUCUCACA	CUGAUGA	X	GAA	AAUCGGGG	CCCCGAUUA	UGUGAGAA
3424	AAGUCGAG	CUGAUGA	X	GAA	AUCUCCUU	AAGGAGAUA	CUCGACUU
3427	AGGAAGUC	CUGAUGA	X	GAA	AGUAUCUC	GAGAUACUC	GACUUCCU
3432	UUCAGAGG	CUGAUGA	X	GAA	AGUCGAGU	ACUCGACUU	CCUCUGAA
3433	UUUCAGAG	CUGAUGA	X	GAA	AAGUCGAG	CUCGACUUC	CUCUGAAA
3436	CCAUUUCA	CUGAUGA	X	GAA	AGGAAGUC	GACUUCCUC	UGAAAUGG
3451	AGAUUCGG	CUGAUGA	X	GAA	AGCCAUCC	GGAUGGCUC	CCGAAUCU
3458	CAAAGAUA	CUGAUGA	X	GAA	AUUCGGGA	UCCCGAAUC	UAUCUUUG
3460	GUCAAAGA	CUGAUGA	X	GAA	AGAUUCGG	CCGAAUCUA	UCUUUGAC
3462	UUGUCAAA	CUGAUGA	X	GAA	AUAGAUUC	GAAUCUAUC	UUUGACAA
3464	UUUUGUCA	CUGAUGA	X	GAA	AGAUAGAU	AUCUAUCUU	UGACAAAA
3465	AUUUUGUC	CUGAUGA	X	GAA	AAGAUAGA	UCUAUCUUU	GACAAAAU
3474	GUGCUGUA	CUGAUGA	X	GAA	AUUUUGUC	GACAAAAUC	UACAGCAC
3476	UGGUGCUG	CUGAUGA	X	GAA	AGAUUUUG	CAAAAUCUA	CAGCACCA
3500	CUCCGUAA	CUGAUGA	X	GAA	ACCACACG	CGUGUGGUC	UUACGGAG
3502	UACUCCGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	ACGGAGUA
3503	AUACUCCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUA	CGGAGUAU
3510	CACAGCAA	CUGAUGA	X	GAA	ACUCCGUA	UACGGAGUA	UUGCUGUG
3512	CCCACAGC	CUGAUGA	X	GAA	AUACUCCG	CGGAGUAUU	GCUGUGGG
3525	AAGGAGAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUC	UUCUCCUU
3527	CUAAGGAG	CUGAUGA	X	GAA	AGAUUUCC	GGAAAUCUU	CUCCUUAG
3528	CCUAAGGA	CUGAUGA	X	GAA	AAGAUUUC	GAAAUCUUC	UCCUUAGG
3530	CACCUAAG	CUGAUGA	X	GAA	AGAAGAUU	AAUCUUCUC	CUUAGGUG
3533	ACCCACCU	CUGAUGA	X	GAA	AGGAGAAG	CUUCUCCUU	AGGUGGGU

3534	GACCCACC CUGAUGA X GAA AAGGAGAA	UUCUCCUUA GGUGGGUC
3542	GGUAUGGA CUGAUGA X GAA ACCCACCU	AGGUGGGUC UCCAUACC
3544	UGGGUAUG CUGAUGA X GAA AGACCCAC	GUGGGUCUC CAUACCCA
3548	CUCCUGGG CUGAUGA X GAA AUGGAGAC	GUCUCCAUA CCCAGGAG
3558	UCCAUUUG CUGAUGA X GAA ACUCCUGG	CCAGGAGUA CAAAUGGA
3575	GACUGCAA CUGAUGA X GAA AGUCCUCA	UGAGGACUU UUGCAGUC
3576	CGACUGCA CUGAUGA X GAA AAGUCCUC	GAGGACUUU UGCAGUCG
3577	GCGACUGC CUGAUGA X GAA AAAGUCCU	AGGACUUUU GCAGUCGC
3583	CCUCAGGC CUGAUGA X GAA ACUGCAAA	UUUGCAGUC GCCUGAGG
3613	GUACUCAG CUGAUGA X GAA AGCUCUCA	UGAGAGCUC CUGAGUAC
3620	GAGUAGAG CUGAUGA X GAA ACUCAGGA	UCCUGAGUA CUCUACUC
3623	CAGGAGUA CUGAUGA X GAA AGUACUCA	UGAGUACUC UACUCCUG
3625	UUCAGGAG CUGAUGA X GAA AGAGUACU	AGUACUCUA CUCCUGAA
3628	GAUUUCAG CUGAUGA X GAA AGUAGAGU	ACUCUACUC CUGAAAUC
3636	AUCUGAUA CUGAUGA X GAA AUUUCAGG	CCUGAAAUC UAUCAGAU
3638	UGAUCUGA CUGAUGA X GAA AGAUUUCA	UGAAAUCUA UCAGAUCA
3640	CAUGAUCU CUGAUGA X GAA AUAGAUUU	AAAUCUAUC AGAUCAUG
3645	UCCAGCAU CUGAUGA X GAA AUCUGAUA	UAUCAGAUC AUGCUGGA
3689	GUUCUGCA CUGAUGA X GAA AUCUUGGC	GCCAAGAUU UGCAGAAC
3690	AGUUCUGC CUGAUGA X GAA AAUCUUGG	CCAAGAUUU GCAGAACU
3699	UUUUCCAC CUGAUGA X GAA AGUUCUGC	GCAGAACUU GUGGAAAA
3711	AAAUCACC CUGAUGA X GAA AGUUUUUC	GAAAAACUA GGUGAUUU
3718	UUGAAGCA CUGAUGA X GAA AUCACCUA	UAGGUGAUU UGCUUCAA
3719	CUUGAAGC CUGAUGA X GAA AAUCACCU	AGGUGAUUU GCUUCAAG
3723	UUUGCUUG CUGAUGA X GAA AGCAAAUC	GAUUUGCUU CAAGCAAA
3724	AUUUGCUU CUGAUGA X GAA AAGCAAAU	AUUUGCUUC AAGCAAAU
3735	UCCUGUUG CUGAUGA X GAA ACAUUUGC	GCAAAUGUA CAACAGGA
3748	GUAGUCUU CUGAUGA X GAA ACCAUCCU	AGGAUGGUA AAGACUAC
3755	UUGGGAUG CUGAUGA X GAA AGUCUUUA	UAAAGACUA CAUCCCAA
3759	UUGAUUGG CUGAUGA X GAA AUGUAGUC	GACUACAUC CCAAUCAA
3765	AUGGCAUU CUGAUGA X GAA AUUGGGAU	AUCCCAAUC AAUGCCAU
3774	CCUGUCAG CUGAUGA X GAA AUGGCAUU	AAUGCCAUA CUGACAGG
3787	AAACCCAC CUGAUGA X GAA AUUUCCUG	CAGGAAAUA GUGGGUUU

3794	AGUAUGUA	CUGAUGA X GAA	ACCCACUA		UAGUGGGUU	UACAUACU
3795	GAGUAUGU	CUGAUGA X GAA	AACCCACU		AGUGGGUUU	ACAUACUC
3796	UGAGUAUG	CUGAUGA X GAA	AAACCCAC		GUGGGUUUA	CAUACUCA
3800	GAGUUGAG	CUGAUGA X GAA	AUGUAAAC		GUUUACAUA	CUCAACUC
3803	CAGGAGUU	CUGAUGA X GAA	AGUAUGUA		UACAUACUC	AACUCCUG
3808	GAAGGCAG	CUGAUGA X GAA	AGUUGAGU		ACUCAACUC	CUGCCUUC
3815	CCUCAGAG	CUGAUGA X GAA	AGGCAGGA		UCCUGCCUU	CUCUGAGG
3816	UCCUCAGA	CUGAUGA X GAA	AAGGCAGG		CCUGCCUUC	UCUGAGGA
3818	AGUCCUCA	CUGAUGA X GAA	AGAAGGCA		UGCCUUCUC	UGAGGACU
3827	CCUUGAAG	CUGAUGA X GAA	AGUCCUCA		UGAGGACUU	CUUCAAGG
3828	UCCUUGAA	CUGAUGA X GAA	AAGUCCUC		GAGGACUUC	UUCAAGGA
3830	UUUCCUUG	CUGAUGA X GAA	AGAAGUCC		GGACUUCUU	CAAGGAAA
3831	CUUUCCUU	CUGAUGA X GAA	AAGAAGUC		GACUUCUUC	AAGGAAAG
3841	AGCUGAAA	CUGAUGA X GAA	ACUUUCCU		AGGAAAGUA	UUUCAGCU
3843	GGAGCUGA	CUGAUGA X GAA	AUACUUUC		GAAAGUAUU	UCAGCUCC
3844	CGGAGCUG	CUGAUGA X GAA	AAUACUUU		AAAGUAUUU	CAGCUCCG
3845	UCGGAGCU	CUGAUGA X GAA	AAAUACUU		AAGUAUUUC	AGCUCCGA
3850	AAACUUCG	CUGAUGA X GAA	AGCUGAAA		UUUCAGCUC	CGAAGUUU
3857	CUGAAUUA	CUGAUGA X GAA	ACUUCGGA		UCCGAAGUU	UAAUUCAG
3858	CCUGAAUU	CUGAUGA X GAA	AACUUCGG		CCGAAGUUU	AAUUCAGG
3859	UCCUGAAU	CUGAUGA X GAA	AAACUUCG		CGAAGUUUA	AUUCAGGA
3862	GCUUCCUG	CUGAUGA X GAA	AUUAAACU		AGUUUAAUU	CAGGAAGC
3863	AGCUUCCU	CUGAUGA X GAA	AAUUAAAC		GUUUAAUUC	AGGAAGCU
3872	CAUCAUCA	CUGAUGA X GAA	AGCUUCCU		AGGAAGCUC	UGAUGAUG
3882	ACAUAUCU	CUGAUGA X GAA	ACAUCAUC		GAUGAUGUC	AGAUAUGU
3887	CAUUUACA	CUGAUGA X GAA	AUCUGACA		UGUCAGAUA	UGUAAAUG
3891	AAAGCAUU	CUGAUGA X GAA	ACAUAUCU		AGAUAUGUA	AAUGCUUU
3898	GAACUUGA	CUGAUGA X GAA	AGCAUUUA		UAAAUGCUU	UCAAGUUC
3899	UGAACUUG	CUGAUGA X GAA	AAGCAUUU		AAAUGCUUU	CAAGUUCA
3900	AUGAACUU	CUGAUGA X GAA	AAAGCAUU		AAUGCUUUC	AAGUUCAU
3905	GGCUCAUG	CUGAUGA X GAA	ACUUGAAA		UUUCAAGUU	CAUGAGCC
3906	AGGCUCAU	CUGAUGA X GAA	AACUUGAA		UUCAAGUUC	AUGAGCCU
3924	AAGGUUUU	CUGAUGA X GAA	AUUCUUUC		GAAAGAAUC	AAAACCUU

3932	GUUCUUCA	CUGAUGA	X	GAA	AGGUUUUG	CAAAACCUU	UGAAGAAC
3933	AGUUCUUC	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	GAAGAACU
3942	UUCGGUAA	CUGAUGA	X	GAA	AGUUCUUC	GAAGAACUU	UUACCGAA
3943	AUUCGGUA	CUGAUGA	X	GAA	AAGUUCUU	AAGAACUUU	UACCGAAU
3944	CAUUCGGU	CUGAUGA	X	GAA	AAAGUUCU	AGAACUUUU	ACCGAAUG
3945	GCAUUCGG	CUGAUGA	X	GAA	AAAAGUUC	GAACUUUUA	CCGAAUGC
3959	CAAACAUG	CUGAUGA	X	GAA	AGGUGGCA	UGCCACCUC	CAUGUUUG
3965	AGUCAUCA	CUGAUGA	X	GAA	ACAUGGAG	CUCCAUGUU	UGAUGACU
3966	UAGUCAUC	CUGAUGA	X	GAA	AACAUGGA	UCCAUGUUU	GAUGACUA
3974	CGCCCUGG	CUGAUGA	X	GAA	AGUCAUCA	UGAUGACUA	CCAGGGCG
3994	GGCCAACA	CUGAUGA	X	GAA	AGUGCUGC	GCAGCACUC	UGUUGGCC
3998	GAGAGGCC	CUGAUGA	X	GAA	ACAGAGUG	CACUCUGUU	GGCCUCUC
4004	GCAUGGGA	CUGAUGA	X	GAA	AGGCCAAC	GUUGGCCUC	UCCCAUGC
4006	CAGCAUGG	CUGAUGA	X	GAA	AGAGGCCA	UGGCCUCUC	CCAUGCUG
4022	UCCAGGUG	CUGAUGA	X	GAA	AGCGCUUC	GAAGCGCUU	CACCUGGA
4023	GUCCAGGU	CUGAUGA	X	GAA	AAGCGCUU	AAGCGCUUC	ACCUGGAC
4052	UCUUGAGC	CUGAUGA	X	GAA	AGGCCUUG	CAAGGCCUC	GCUCAAGA
4056	UCAAUCUU	CUGAUGA	X	GAA	AGCGAGGC	GCCUCGCUC	AAGAUUGA
4062	CUCAAGUC	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUU	GACUUGAG
4067	UUACUCUC	CUGAUGA	X	GAA	AGUCAAUC	GAUUGACUU	GAGAGUAA
4074	UUACUGGU	CUGAUGA	X	GAA	ACUCUCAA	UUGAGAGUA	ACCAGUAA
4081	CUUACUUU	CUGAUGA	X	GAA	ACUGGUUA	UAACCAGUA	AAAGUAAG
4087	CGACUCCU	CUGAUGA	X	GAA	ACUUUUAC	GUAAAAGUA	AGGAGUCG
4094	ACAGCCCC	CUGAUGA	X	GAA	ACUCCUUA	UAAGGAGUC	GGGGCUGU
4103	UGACAUCA	CUGAUGA	X	GAA	ACAGCCCC	GGGGCUGUC	UGAUGUCA
4110	GGCCUGCU	CUGAUGA	X	GAA	ACAUCAGA	UCUGAUGUC	AGCAGGCC
4123	AUGGCAGA	CUGAUGA	X	GAA	ACUGGGCC	GGCCCAGUU	UCUGCCAU
4124	AAUGGCAG	CUGAUGA	X	GAA	AACUGGGC	GCCCAGUUU	CUGCCAUU
4125	GAAUGGCA	CUGAUGA	X	GAA	AAACUGGG	CCCAGUUUC	UGCCAUUC
4132	ACAGCUGG	CUGAUGA	X	GAA	AUGGCAGA	UCUGCCAUU	CCAGCUGU
4133	CACAGCUG	CUGAUGA	X	GAA	AAUGGCAG	CUGCCAUUC	CAGCUGUG
4149	CCUUCGCU	CUGAUGA	X	GAA	ACGUGCCC	GGGCACGUC	AGCGAAGG
4169	CGUAGGUG	CUGAUGA	X	GAA	ACCUGCGC	GCGCAGGUU	CACCUACG

4170	UCGUAGGU CUGAUGA X GAA AACCUGCG	CGCAGGUUC ACCUACGA
4175	CGUGGUCG CUGAUGA X GAA AGGUGAAC	GUUCACCUA CGACCACG
4203	CAGCACGC CUGAUGA X GAA AUUUUCCU	AGGAAAAUC GCGUGCUG
4214	GGGGCGGG CUGAUGA X GAA AGCAGCAC	GUGCUGCUC CCCGCCCC
4229	CCGAGUUG CUGAUGA X GAA AGUCUGGG	CCCAGACUA CAACUCGG
4235	GGACCACC CUGAUGA X GAA AGUUGUAG	CUACAACUC GGUGGUCC
4242	GAGUACAG CUGAUGA X GAA ACCACCGA	UCGGUGGUC CUGUACUC
4247	GGGUGGAG CUGAUGA X GAA ACAGGACC	GGUCCUGUA CUCCACCC
4250	GUGGGGUG CUGAUGA X GAA AGUACAGG	CCUGUACUC CACCCCAC
4263	AAACUCUA CUGAUGA X GAA AUGGGUGG	CCACCCAUC UAGAGUUU
4265	UCAAACUC CUGAUGA X GAA AGAUGGGU	ACCCAUCUA GAGUUUGA
4270	UCGUGUCA CUGAUGA X GAA ACUCUAGA	UCUAGAGUU UGACACGA
4271	UUCGUGUC CUGAUGA X GAA AACUCUAG	CUAGAGUUU GACACGAA
4284	CUAGAAAU CUGAUGA X GAA AGGCUUCG	CGAAGCCUU AUUUCUAG
4285	UCUAGAAA CUGAUGA X GAA AAGGCUUC	GAAGCCUUA UUUCUAGA
4287	CUUCUAGA CUGAUGA X GAA AUAAGGCU	AGCCUUAUU UCUAGAAG
4288	GCUUCUAG CUGAUGA X GAA AAUAAGGC	GCCUUAUUU CUAGAAGC
4289	UGCUUCUA CUGAUGA X GAA AAAUAAGG	CCUUAUUUC UAGAAGCA
4291	UGUGCUUC CUGAUGA X GAA AGAAAUAA	UUAUUUCUA GAAGCACA
4305	GGUAUAAA CUGAUGA X GAA ACACAUGU	ACAUGUGUA UUUAUACC
4307	GGGGUAUA CUGAUGA X GAA AUACACAU	AUGUGUAUU UAUACCCC
4308	GGGGGUAU CUGAUGA X GAA AAUACACA	UGUGUAUUU AUACCCCC
4309	UGGGGGUA CUGAUGA X GAA AAAUACAC	GUGUAUUUA UACCCCCA
4311	CCUGGGGG CUGAUGA X GAA AUAAAUAC	GUAUUUAUA CCCCCAGG
4325	GCAAAAGC CUGAUGA X GAA AGUUUCCU	AGGAAACUA GCUUUUGC
4329	ACUGGCAA CUGAUGA X GAA AGCUAGUU	AACUAGCUU UUGCCAGU
4330	UACUGGCA CUGAUGA X GAA AAGCUAGU	ACUAGCUUU UGCCAGUA
4331	AUACUGGC CUGAUGA X GAA AAAGCUAG	CUAGCUUUU GCCAGUAU
4338	AUGCAUAA CUGAUGA X GAA ACUGGCAA	UUGCCAGUA UUAUGCAU
4340	AUAUGCAU CUGAUGA X GAA AUACUGGC	GCCAGUAUU AUGCAUAU
4341	UAUAUGCA CUGAUGA X GAA AAUACUGG	CCAGUAUUA UGCAUAUA
4347	AACUUAUA CUGAUGA X GAA AUGCAUAA	UUAUGCAUA UAUAAGUU
4349	UAAACUUA CUGAUGA X GAA AUAUGCAU	AUGCAUAUA UAAGUUUA

4351	UGUAAACU	CUGAUGA	X	GAA	AUAUAUGC	GCAUAUAUA	AGUUUACA
4355	AAGGUGUA	CUGAUGA	X	GAA	ACUUAUAU	AUAUAAGUU	UACACCUU
4356	AAAGGUGU	CUGAUGA	X	GAA	AACUUAUA	UAUAAGUUU	ACACCUUU
4357	UAAAGGUG	CUGAUGA	X	GAA	AAACUUAU	AUAAGUUUA	CACCUUUA
4363	GAAAGAUA	CUGAUGA	X	GAA	AGGUGUAA	UUACACCUU	UAUCUUUC
4364	GGAAAGAU	CUGAUGA	X	GAA	AAGGUGUA	UACACCUUU	AUCUUUCC
4365	UGGAAAGA	CUGAUGA	X	GAA	AAAGGUGU	ACACCUUUA	UCUUUCCA
4367	CAUGGAAA	CUGAUGA	X	GAA	AUAAAGGU	ACCUUUAUC	UUUCCAUG
4369	CCCAUGGA	CUGAUGA	X	GAA	AGAUAAAG	CUUUAUCUU	UCCAUGGG
4370	UCCCAUGG	CUGAUGA	X	GAA	AAGAUAAA	UUUAUCUUU	CCAUGGGA
4371	CUCCCAUG	CUGAUGA	X	GAA	AAAGAUAA	UUAUCUUUC	CAUGGGAG
4389	AUCACAAA	CUGAUGA	X	GAA	AGCAGCUG	CAGCUGCUU	UUUGUGAU
4390	AAUCACAA	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	UUGUGAUU
4391	AAAUCACA	CUGAUGA	X	GAA	AAAGCAGC	GCUGCUUUU	UGUGAUUU
4392	AAAAUCAC	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUU	GUGAUUUU
4398	AUUAAAAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUUUUAAU
4399	UAUUAAAA	CUGAUGA	X	GAA	AAUCACAA	UUGUGAUUU	UUUUAAUA
4400	CUAUUAAA	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	UUUAAUAG
4401	ACUAUUAA	CUGAUGA	X	GAA	AAAAUCAC	GUGAUUUUU	UUAAUAGU
4402	CACUAUUA	CUGAUGA	X	GAA	AAAAAUCA	UGAUUUUUU	UAAUAGUG
4403	GCACUAUU	CUGAUGA	X	GAA	AAAAAAUC	GAUUUUUUU	AAUAGUGC
4404	AGCACUAU	CUGAUGA	X	GAA	AAAAAAAU	AUUUUUUUA	AUAGUGCU
4407	AAAAGCAC	CUGAUGA	X	GAA	AUUAAAAA	UUUUUAAUA	GUGCUUUU
4413	AAAAAAAA	CUGAUGA	X	GAA	AGCACUAU	AUAGUGCUU	UUUUUUUU
4414	AAAAAAAA	CUGAUGA	X	GAA	AAGCACUA	UAGUGCUUU	UUUUUUUU
4415	CAAAAAAA	CUGAUGA	X	GAA	AAAGCACU	AGUGCUUUU	UUUUUUUG
4416	UCAAAAAA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UUUUUUGA
4417	GUCAAAAA	CUGAUGA	X	GAA	AAAAAGCA	UGCUUUUUU	UUUUUGAC
4418	AGUCAAAA	CUGAUGA	X	GAA	AAAAAAGC	GCUUUUUUU	UUUUGACU
4419	UAGUCAAA	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU	UUUGACUA
4420	UUAGUCAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUGACUAA
4421	GUUAGUCA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UGACUAAC
4422	UGUUAGUC	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	GACUAACA

4427	AUUCUUGU CUGAUGA X GAA AGUCAAAA	UUUUGACUA ACAAGAAU
4438	UCUGGAGU CUGAUGA X GAA ACAUUCUU	AAGAAUGUA ACUCCAGA
4442	UCUAUCUG CUGAUGA X GAA AGUUACAU	AUGUAACUC CAGAUAGA
4448	UAUUUCUC CUGAUGA X GAA AUCUGGAG	CUCCAGAUA GAGAAAUA
4456	CUUGUCAC CUGAUGA X GAA AUUUCUCU	AGAGAAAUA GUGACAAG
4476	UUUAGCAG CUGAUGA X GAA AGUGUUCU	AGAACACUA CUGCUAAA
4482	UGAGGAUU CUGAUGA X GAA AGCAGUAG	CUACUGCUA AAUCCUCA
4486	AACAUGAG CUGAUGA X GAA AUUUAGCA	UGCUAAAUC CUCAUGUU
4489	AGUAACAU CUGAUGA X GAA AGGAUUUA	UAAAUCCUC AUGUUACU
4494	CACUGAGU CUGAUGA X GAA ACAUGAGG	CCUCAUGUU ACUCAGUG
4495	ACACUGAG CUGAUGA X GAA AACAUGAG	CUCAUGUUA CUCAGUGU
4498	CUAACACU CUGAUGA X GAA AGUAACAU	AUGUUACUC AGUGUUAG
4504	AUUUCUCU CUGAUGA X GAA ACACUGAG	CUCAGUGUU AGAGAAAU
4505	GAUUUCUC CUGAUGA X GAA AACACUGA	UCAGUGUUA GAGAAAUC
4513	UUAGGAAG CUGAUGA X GAA AUUUCUCU	AGAGAAAUC CUUCCUAA
4516	GGUUUAGG CUGAUGA X GAA AGGAUUUC	GAAAUCCUU CCUAAACC
4517	GGGUUUAG CUGAUGA X GAA AAGGAUUU	AAAUCCUUC CUAAACCC
4520	AUUGGGUU CUGAUGA X GAA AGGAAGGA	UCCUUCCUA AACCCAAU
4533	GAGCAGGG CUGAUGA X GAA AGUCAUUG	CAAUGACUU CCCUGCUC
4534	GGAGCAGG CUGAUGA X GAA AAGUCAUU	AAUGACUUC CCUGCUCC
4541	GGGGGUUG CUGAUGA X GAA AGCAGGGA	UCCCUGCUC CAACCCCC
4557	CGUGCCCU CUGAUGA X GAA AGGUGGCG	CGCCACCUC AGGGCACG
4576	CUCAAUCA CUGAUGA X GAA ACUGGUCC	GGACCAGUU UGAUUGAG
4577	CCUCAAUC CUGAUGA X GAA AACUGGUC	GACCAGUUU GAUUGAGG
4581	AGCUCCUC CUGAUGA X GAA AUCAAACU	AGUUUGAUU GAGGAGCU
4598	CAUUGGGU CUGAUGA X GAA AUCAGUGC	GCACUGAUC ACCCAAUG
4610	GGGUACGU CUGAUGA X GAA AUGCAUUG	CAAUGCAUC ACGUACCC
4615	CAGUGGGG CUGAUGA X GAA ACGUGAUG	CAUCACGUA CCCCACUG
4664	CUGGGGCU CUGAUGA X GAA ACGGGCUU	AAGCCCGUU AGCCCCAG
4665	CCUGGGGC CUGAUGA X GAA AACGGGCU	AGCCCGUUA GCCCCAGG
4678	CAGCCAGU CUGAUGA X GAA AUCCCCUG	CAGGGGAUC ACUGGCUG
4700	ACUCCCGA CUGAUGA X GAA AUGUUGCU	AGCAACAUC UCGGGAGU
4702	GGACUCCC CUGAUGA X GAA AGAUGUUG	CAACAUCUC GGGAGUCC

4709	UGCUAGAG CUGAUGA X GAA ACUCCCGA	UCGGGAGUC CUCUAGCA
4712	GCCUGCUA CUGAUGA X GAA AGGACUCC	GGAGUCCUC UAGCAGGC
4714	AGGCCUGC CUGAUGA X GAA AGAGGACU	AGUCCUCUA GCAGGCCU
4723	ACAUGUCU CUGAUGA X GAA AGGCCUGC	GCAGGCCUA AGACAUGU
4802	GCGUCUCA CUGAUGA X GAA AUUCUUUC	GAAAGAAUU UGAGACGC
4803	UGCGUCUC CUGAUGA X GAA AAUUCUUU	AAAGAAUUU GAGACGCA
4840	GCAUUGCU CUGAUGA X GAA AGCCCCGU	ACGGGGCUC AGCAAUGC
4852	GCCACUGA CUGAUGA X GAA AUGGCAUU	AAUGCCAUU UCAGUGGC
4853	AGCCACUG CUGAUGA X GAA AAUGGCAU	AUGCCAUUU CAGUGGCU
4854	AAGCCACU CUGAUGA X GAA AAAUGGCA	UGCCAUUUC AGUGGCUU
4862	GAGCUGGG CUGAUGA X GAA AGCCACUG	CAGUGGCUU CCCAGCUC
4863	AGAGCUGG CUGAUGA X GAA AAGCCACU	AGUGGCUUC CCAGCUCU
4870	AAGGGUCA CUGAUGA X GAA AGCUGGGA	UCCCAGCUC UGACCCUU
4878	AAAUGUAG CUGAUGA X GAA AGGGUCAG	CUGACCCUU CUACAUUU
4879	CAAAUGUA CUGAUGA X GAA AAGGGUCA	UGACCCUUC UACAUUUG
4881	CUCAAAUG CUGAUGA X GAA AGAAGGGU	ACCCUUCUA CAUUUGAG
4885	GGCCCUCA CUGAUGA X GAA AUGUAGAA	UUCUACAUU UGAGGGCC
4886	GGGCCCUC CUGAUGA X GAA AAUGUAGA	UCUACAUUU GAGGGCCC
4929	AUCCAGAA CUGAUGA X GAA AUGUCCCC	GGGGACAUU UUCUGGAU
4930	AAUCCAGA CUGAUGA X GAA AAUGUCCC	GGGACAUUU UCUGGAUU
4931	GAAUCCAG CUGAUGA X GAA AAAUGUCC	GGACAUUUU CUGGAUUC
4932	AGAAUCCA CUGAUGA X GAA AAAAUGUC	GACAUUUUC UGGAUUCU
4938	CCUCCCAG CUGAUGA X GAA AUCCAGAA	UUCUGGAUU CUGGGAGG
4939	GCCUCCCA CUGAUGA X GAA AAUCCAGA	UCUGGAUUC UGGGAGGC
4963	AAAAAAGA CUGAUGA X GAA AUUUGUCC	GGACAAAUA UCUUUUUU
4965	CCAAAAAA CUGAUGA X GAA AUAUUUGU	ACAAAUAUC UUUUUUGG
4967	UUCCAAAA CUGAUGA X GAA AGAUAUUU	AAAUAUCUU UUUUGGAA
4968	GUUCCAAA CUGAUGA X GAA AAGAUAUU	AAUAUCUUU UUUGGAAC
4969	AGUUCCAA CUGAUGA X GAA AAAGAUAU	AUAUCUUUU UUGGAACU
4970	UAGUUCCA CUGAUGA X GAA AAAAGAUA	UAUCUUUUU UGGAACUA
4971	UUAGUUCC CUGAUGA X GAA AAAAAGAU	AUCUUUUUU GGAACUAA
4978	AUUUGCUU CUGAUGA X GAA AGUUCCAA	UUGGAACUA AAGCAAAU
4987	AGGUCUAA CUGAUGA X GAA AUUUGCUU	AAGCAAAUU UUAGACCU

4988	AAGGUCUA CUGAUGA X GAA AAUUUGCU	AGCAAAUUU UAGACCUU
4989	AAAGGUCU CUGAUGA X GAA AAAUUUGC	GCAAAUUUU AGACCUUU
4990	UAAAGGUC CUGAUGA X GAA AAAAUUUG	CAAAUUUUA GACCUUUA
4996	CAUAGGUA CUGAUGA X GAA AGGUCUAA	UUAGACCUU UACCUAUG
4997	CCAUAGGU CUGAUGA X GAA AAGGUCUA	UAGACCUUU ACCUAUGG
4998	UCCAUAGG CUGAUGA X GAA AAAGGUCU	AGACCUUUA CCUAUGGA
5002	CACUUCCA CUGAUGA X GAA AGGUAAAG	CUUUACCUA UGGAAGUG
5013	GGACAUAG CUGAUGA X GAA ACCACUUC	GAAGUGGUU CUAUGUCC
5014	UGGACAUA CUGAUGA X GAA AACCACUU	AAGUGGUUC UAUGUCCA
5016	AAUGGACA CUGAUGA X GAA AGAACCAC	GUGGUUCUA UGUCCAUU
5020	UGAGAAUG CUGAUGA X GAA ACAUAGAA	UUCUAUGUC CAUUCUCA
5024	CGAAUGAG CUGAUGA X GAA AUGGACAU	AUGUCCAUU CUCAUUCG
5025	ACGAAUGA CUGAUGA X GAA AAUGGACA	UGUCCAUUC UCAUUCGU
5027	CCACGAAU CUGAUGA X GAA AGAAUGGA	UCCAUUCUC AUUCGUGG
5030	AUGCCACG CUGAUGA X GAA AUGAGAAU	AUUCUCAUU CGUGGCAU
5031	CAUGCCAC CUGAUGA X GAA AAUGAGAA	UUCUCAUUC GUGGCAUG
5041	CAAAUCAA CUGAUGA X GAA ACAUGCCA	UGGCAUGUU UUGAUUUG
5042	ACAAAUCA CUGAUGA X GAA AACAUGCC	GGCAUGUUU UGAUUUGU
5043	UACAAAUC CUGAUGA X GAA AAACAUGC	GCAUGUUUU GAUUUGUA
5047	GUGCUACA CUGAUGA X GAA AUCAAAAC	GUUUUGAUU UGUAGCAC
5048	AGUGCUAC CUGAUGA X GAA AAUCAAAA	UUUUGAUUU GUAGCACU
5051	CUCAGUGC CUGAUGA X GAA ACAAAUCA	UGAUUUGUA GCACUGAG
5069	UCAGAGUU CUGAUGA X GAA AGUGCCAC	GUGGCACUC AACUCUGA
5074	UGGGCUCA CUGAUGA X GAA AGUUGAGU	ACUCAACUC UGAGCCCA
5084	GCCAAAAG CUGAUGA X GAA AUGGGCUC	GAGCCCAUA CUUUUGGC
5087	GGAGCCAA CUGAUGA X GAA AGUAUGGG	CCCAUACUU UUGGCUCC
5088	AGGAGCCA CUGAUGA X GAA AAGUAUGG	CCAUACUUU UGGCUCCU
5089	GAGGAGCC CUGAUGA X GAA AAAGUAUG	CAUACUUUU GGCUCCUC
5094	UACUAGAG CUGAUGA X GAA AGCCAAAA	UUUUGGCUC CUCUAGUA
5097	UCUUACUA CUGAUGA X GAA AGGAGCCA	UGGCUCCUC UAGUAAGA
5099	CAUCUUAC CUGAUGA X GAA AGAGGAGC	GCUCCUCUA GUAAGAUG
5102	GUGCAUCU CUGAUGA X GAA ACUAGAGG	CCUCUAGUA AGAUGCAC
5119	CUCUGGCU CUGAUGA X GAA AGUUUUCA	UGAAAACUU AGCCAGAG

5120	ACUCUGGC CUGAUGA X GAA AAGUUUUC	GAAAACUUA GCCAGAGU
5129	GACAACCU CUGAUGA X GAA ACUCUGGC	GCCAGAGUU AGGUUGUC
5130	AGACAACC CUGAUGA X GAA AACUCUGG	CCAGAGUUA GGUUGUCU
5134	CUGGAGAC CUGAUGA X GAA ACCUAACU	AGUUAGGUU GUCUCCAG
5137	GGCCUGGA CUGAUGA X GAA ACAACCUA	UAGGUUGUC UCCAGGCC
5139	AUGGCCUG CUGAUGA X GAA AGACAACC	GGUUGUCUC CAGGCCAU
5156	UUCAGUGU CUGAUGA X GAA AGGCCAUC	GAUGGCCUU ACACUGAA
5157	UUUCAGUG CUGAUGA X GAA AAGGCCAU	AUGGCCUUA CACUGAAA
5170	UAGAAUGU CUGAUGA X GAA ACAUUUUC	GAAAAUGUC ACAUUCUA
5175	CAAAAUAG CUGAUGA X GAA AUGUGACA	UGUCACAUU CUAUUUUG
5176	CCAAAAUA CUGAUGA X GAA AAUGUGAC	GUCACAUUC UAUUUUGG
5178	ACCCAAAA CUGAUGA X GAA AGAAUGUG	CACAUUCUA UUUUGGGU
5180	AUACCCAA CUGAUGA X GAA AUAGAAUG	CAUUCUAUU UUGGGUAU
5181	AAUACCCA CUGAUGA X GAA AAUAGAAU	AUUCUAUUU UGGGUAUU
5182	UAAUACCC CUGAUGA X GAA AAAUAGAA	UUCUAUUUU GGGUAUUA
5187	UAUAUUAA CUGAUGA X GAA ACCCAAAA	UUUUGGGUA UUAAUAUA
5189	UAUAUAUU CUGAUGA X GAA AUACCCAA	UUGGGUAUU AAUAUAUA
5190	CUAUAUAU CUGAUGA X GAA AAUACCCA	UGGGUAUUA AUAUAUAG
5193	GGACUAUA CUGAUGA X GAA AUUAAUAC	GUAUUAAUA UAUAGUCC
5195	CUGGACUA CUGAUGA X GAA AUAUUAAU	AUUAAUAUA UAGUCCAG
5197	GUCUGGAC CUGAUGA X GAA AUAUAUUA	UAAUAUAUA GUCCAGAC
5200	AGUGUCUG CUGAUGA X GAA ACUAUAUA	UAUAUAGUC CAGACACU
5209	AUUGAGUU CUGAUGA X GAA AGUGUCUG	CAGACACUU AACUCAAU
5210	AAUUGAGU CUGAUGA X GAA AAGUGUCU	AGACACUUA ACUCAAUU
5214	AAGAAAUU CUGAUGA X GAA AGUUAAGU	ACUUAACUC AAUUUCUU
5218	UACCAAGA CUGAUGA X GAA AUUGAGUU	AACUCAAUU UCUUGGUA
5219	AUACCAAG CUGAUGA X GAA AAUUGAGU	ACUCAAUUU CUUGGUAU
5220	AAUACCAA CUGAUGA X GAA AAAUUGAG	CUCAAUUUC UUGGUAUU
5222	AUAAUACC CUGAUGA X GAA AGAAAUUG	CAAUUUCUU GGUAUUAU
5226	CAGAAUAA CUGAUGA X GAA ACCAAGAA	UUCUUGGUA UUAUUCUG
5228	AACAGAAU CUGAUGA X GAA AUACCAAG	CUUGGUAUU AUUCUGUU
5229	AAACAGAA CUGAUGA X GAA AAUACCAA	UUGGUAUUA UUCUGUUU
5231	CAAAACAG CUGAUGA X GAA AUAAUACC	GGUAUUAUU CUGUUUUG

5232	GCAAAACA	CUGAUGA	X	GAA	AAUAAUAC	GUAUUAUUC	UGUUUUGC
5236	CUGUGCAA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUU	UUGCACAG
5237	ACUGUGCA	CUGAUGA	X	GAA	AACAGAAU	AUUCUGUUU	UGCACAGU
5238	AACUGUGC	CUGAUGA	X	GAA	AAACAGAA	UUCUGUUUU	GCACAGUU
5246	UCACAACU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU	AGUUGUGA
5247	UUCACAAC	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA	GUUGUGAA
5250	UCUUUCAC	CUGAUGA	X	GAA	ACUAACUG	CAGUUAGUU	GUGAAAGA
5284	CUCCUCAG	CUGAUGA	X	GAA	ACUGCAUU	AAUGCAGUC	CUGAGGAG
5296	AUGGAGAA	CUGAUGA	X	GAA	ACUCUCCU	AGGAGAGUU	UUCUCCAU
5297	UAUGGAGA	CUGAUGA	X	GAA	AACUCUCC	GGAGAGUUU	UCUCCAUA
5298	AUAUGGAG	CUGAUGA	X	GAA	AAACUCUC	GAGAGUUUU	CUCCAUAU
5299	GAUAUGGA	CUGAUGA	X	GAA	AAAACUCU	AGAGUUUUC	UCCAUAUC
5301	UUGAUAUG	CUGAUGA	X	GAA	AGAAAACU	AGUUUUCUC	CAUAUCAA
5305	CGUUUUGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCAAAACG
5307	CUCGUUUU	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC	AAAACGAG
5336	ACCUUAUU	CUGAUGA	X	GAA	ACCUUUUU	AAAAAGGUC	AAUAAGGU
5340	CUUGACCU	CUGAUGA	X	GAA	AUUGACCU	AGGUCAAUA	AGGUCAAG
5345	CUUCCCUU	CUGAUGA	X	GAA	ACCUUAUU	AAUAAGGUC	AAGGGAAG
5361	GGUAUAGA	CUGAUGA	X	GAA	ACGGGGUC	GACCCCGUC	UCUAUACC
5363	UUGGUAUA	CUGAUGA	X	GAA	AGACGGGG	CCCCGUCUC	UAUACCAA
5365	GGUUGGUA	CUGAUGA	X	GAA	AGAGACGG	CCGUCUCUA	UACCAACC
5367	UUGGUUGG	CUGAUGA	X	GAA	AUAGAGAC	GUCUCUAUA	CCAACCAA
5382	UGUUGGUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUU	CACCAACA
5383	GUGUUGGU	CUGAUGA	X	GAA	AAUUGGUU	AACCAAUUC	ACCAACAC
5395	UGGGUCCC	CUGAUGA	X	GAA	ACUGUGUU	AACACAGUU	GGGACCCA
5417	ACGUGACU	CUGAUGA	X	GAA	ACUUCCUG	CAGGAAGUC	AGUCACGU
5421	GGAAACGU	CUGAUGA	X	GAA	ACUGACUU	AAGUCAGUC	ACGUUUCC
5426	GAAAAGGA	CUGAUGA	X	GAA	ACGUGACU	AGUCACGUU	UCCUUUUC
5427	UGAAAAGG	CUGAUGA	X	GAA	AACGUGAC	GUCACGUUU	CCUUUUCA
5428	AUGAAAAG	CUGAUGA	X	GAA	AAACGUGA	UCACGUUUC	CUUUUCAU
5431	UAAAUGAA	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUU	UUCAUUUA
5432	UUAAAUGA	CUGAUGA	X	GAA	AAGGAAAC	GUUUCCUUU	UCAUUUAA
5433	AUUAAAUG	CUGAUGA	X	GAA	AAAGGAAA	UUUCCUUUU	CAUUUAAU

5434	CAUUAAAU	CUGAUGA	X	GAA	AAAAGGAA	UUCCUUUUC AUUUAAUG
5437	CCCCAUUA	CUGAUGA	X	GAA	AUGAAAAG	CUUUUCAUU UAAUGGGG
5438	UCCCCAUU	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU AAUGGGGA
5439	AUCCCCAU	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUA AUGGGGAU
5448	GAUAGUGG	CUGAUGA	X	GAA	AUCCCCAU	AUGGGGAUU CCACUAUC
5449	AGAUAGUG	CUGAUGA	X	GAA	AAUCCCCA	UGGGGAUUC CACUAUCU
5454	GUGUGAGA	CUGAUGA	X	GAA	AGUGGAAU	AUUCCACUA UCUCACAC
5456	UAGUGUGA	CUGAUGA	X	GAA	AUAGUGGA	UCCACUAUC UCACACUA
5458	AUUAGUGU	CUGAUGA	X	GAA	AGAUAGUG	CACUAUCUC ACACUAAU
5464	UUUCAGAU	CUGAUGA	X	GAA	AGUGUGAG	CUCACACUA AUCUGAAA
5467	UCCUUUCA	CUGAUGA	X	GAA	AUUAGUGU	ACACUAAUC UGAAAGGA
5489	CGCCAGCU	CUGAUGA	X	GAA	AUGCUCUU	AAGAGCAUU AGCUGGCG
5490	GCGCCAGC	CUGAUGA	X	GAA	AAUGCUCU	AGAGCAUUA GCUGGCGC
5501	GUGCUUAA	CUGAUGA	X	GAA	AUGCGCCA	UGGCGCAUA UUAAGCAC
5503	AAGUGCUU	CUGAUGA	X	GAA	AUAUGCGC	GCGCAUAUU AAGCACUU
5504	AAAGUGCU	CUGAUGA	X	GAA	AAUAUGCG	CGCAUAUUA AGCACUUU
5511	GGAGCUUA	CUGAUGA	X	GAA	AGUGCUUA	UAAGCACUU UAAGCUCC
5512	AGGAGCUU	CUGAUGA	X	GAA	AAGUGCUU	AAGCACUUU AAGCUCCU
5513	AAGGAGCU	CUGAUGA	X	GAA	AAAGUGCU	AGCACUUUA AGCUCCUU
5518	UACUCAAG	CUGAUGA	X	GAA	AGCUUAAA	UUUAAGCUC CUUGAGUA
5521	UUUUACUC	CUGAUGA	X	GAA	AGGAGCUU	AAGCUCCUU GAGUAAAA
5526	CACCUUUU	CUGAUGA	X	GAA	ACUCAAGG	CCUUGAGUA AAAAGGUG
5537	AAAUUACA	CUGAUGA	X	GAA	ACCACCUU	AAGGUGGUA UGUAAUUU
5541	GCAUAAAU	CUGAUGA	X	GAA	ACAUACCA	UGGUAUGUA AUUUAUGC
5544	CUUGCAUA	CUGAUGA	X	GAA	AUUACAUA	UAUGUAAUU UAUGCAAG
5545	CCUUGCAU	CUGAUGA	X	GAA	AAUUACAU	AUGUAAUUU AUGCAAGG
5546	ACCUUGCA	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA UGCAAGGU
5555	UGGAGAAA	CUGAUGA	X	GAA	ACCUUGCA	UGCAAGGUA UUUCUCCA
5557	ACUGGAGA	CUGAUGA	X	GAA	AUACCUUG	CAAGGUAUU UCUCCAGU
5558	AACUGGAG	CUGAUGA	X	GAA	AAUACCUU	AAGGUAUUU CUCCAGUU
5559	CAACUGGA	CUGAUGA	X	GAA	AAAUACCU	AGGUAUUUC UCCAGUUG
5561	CCCAACUG	CUGAUGA	X	GAA	AGAAAUAC	GUAUUUCUC CAGUUGGG
5566	UGAGUCCC	CUGAUGA	X	GAA	ACUGGAGA	UCUCCAGUU GGGACUCA

5573	AAUAUCCU	CUGAUGA X GAA	AGUCCCAA		UUGGGACUC	AGGAUAUU
5579	UUAACUAA	CUGAUGA X GAA	AUCCUGAG		CUCAGGAUA	UUAGUUAA
5581	CAUUAACU	CUGAUGA X GAA	AUAUCCUG		CAGGAUAUU	AGUUAAUG
5582	UCAUUAAC	CUGAUGA X GAA	AAUAUCCU		AGGAUAUUA	GUUAAUGA
5585	GGCUCAUU	CUGAUGA X GAA	ACUAAUAU		AUAUUAGUU	AAUGAGCC
5586	UGGCUCAU	CUGAUGA X GAA	AACUAAUA		UAUUAGUUA	AUGAGCCA
5596	CUUCUAGU	CUGAUGA X GAA	AUGGCUCA		UGAGCCAUC	ACUAGAAG
5600	UUUUCUUC	CUGAUGA X GAA	AGUGAUGG		CCAUCACUA	GAAGAAAA
5615	CAGUUGAA	CUGAUGA X GAA	AUGGGCUU		AAGCCCAUU	UUCAACUG
5616	GCAGUUGA	CUGAUGA X GAA	AAUGGGCU		AGCCCAUUU	UCAACUGC
5617	AGCAGUUG	CUGAUGA X GAA	AAAUGGGC		GCCCAUUUU	CAACUGCU
5618	AAGCAGUU	CUGAUGA X GAA	AAAAUGGG		CCCAUUUUC	AACUGCUU
5626	AAGUUUCA	CUGAUGA X GAA	AGCAGUUG		CAACUGCUU	UGAAACUU
5627	CAAGUUUC	CUGAUGA X GAA	AAGCAGUU		AACUGCUUU	GAAACUUG
5634	CCCCAGGC	CUGAUGA X GAA	AGUUUCAA		UUGAAACUU	GCCUGGGG
5644	CAUGCUCA	CUGAUGA X GAA	ACCCCAGG		CCUGGGGUC	UGAGCAUG
5661	UGUCUCCC	CUGAUGA X GAA	AUUCCCAU		AUGGGAAUA	GGGAGACA
5674	CCCUUUCC	CUGAUGA X GAA	ACCCUGUC		GACAGGGUA	GGAAAGGG
5688	CUGAAGAG	CUGAUGA X GAA	AGGCGCCC		GGGCGCCUA	CUCUUCAG
5691	ACCCUGAA	CUGAUGA X GAA	AGUAGGCG		CGCCUACUC	UUCAGGGU
5693	AGACCCUG	CUGAUGA X GAA	AGAGUAGG		CCUACUCUU	CAGGGUCU
5694	UAGACCCU	CUGAUGA X GAA	AAGAGUAG		CUACUCUUC	AGGGUCUA
5700	GAUCUUUA	CUGAUGA X GAA	ACCCUGAA		UUCAGGGUC	UAAAGAUC
5702	UUGAUCUU	CUGAUGA X GAA	AGACCCUG		CAGGGUCUA	AAGAUCAA
5708	GCCCACUU	CUGAUGA X GAA	AUCUUUAG		CUAAAGAUC	AAGUGGGC
5719	AGCGAUCC	CUGAUGA X GAA	AGGCCCAC		GUGGGCCUU	GGAUCGCU
5724	AGCUUAGC	CUGAUGA X GAA	AUCCAAGG		CCUUGGAUC	GCUAAGCU
5728	AGCCAGCU	CUGAUGA X GAA	AGCGAUCC		GGAUCGCUA	AGCUGGCU
5737	AUCAAACA	CUGAUGA X GAA	AGCCAGCU		AGCUGGCUC	UGUUUGAU
5741	UAGCAUCA	CUGAUGA X GAA	ACAGAGCC		GGCUCUGUU	UGAUGCUA
5742	AUAGCAUC	CUGAUGA X GAA	AACAGAGC		GCUCUGUUU	GAUGCUAU
5749	UGCAUAAA	CUGAUGA X GAA	AGCAUCAA		UUGAUGCUA	UUUAUGCA
5751	CUUGCAUA	CUGAUGA X GAA	AUAGCAUC		GAUGCUAUU	UAUGCAAG

5752	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU AUGCAAGU
5753	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUA UGCAAGUU
5761	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU AGGGUCUA
5762	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUA GGGUCUAU
5767	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC UAUGUAUU
5769	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA UGUAUUUA
5773	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA UUUAGGAU
5775	GCAUCCUA	CUGAUGA	X	GAA	AUACAUAG	CUAUGUAUU UAGGAUGC
5776	CGCAUCCU	CUGAUGA	X	GAA	AAUACAUA	UAUGUAUUU AGGAUGCG
5777	GCGCAUCC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUA GGAUGCGC
5788	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCAU	AUGCGCCUA CUCUUCAG
5791	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC UUCAGGGU
5793	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU CAGGGUCU
5794	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC AGGGUCUA
5800	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC UAAAGAUC
5802	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA AAGAUCAA
5808	GCCCACUU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC AAGUGGGC
5819	AGCGAUCC	CUGAUGA	X	GAA	AGGCCCAC	GUGGGCCUU GGAUCGCU
5824	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC GCUAAGCU
5828	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA AGCUGGCU
5837	AUCAAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC UGUUUGAU
5841	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU UGAUGCUA
5842	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU GAUGCUAU
5849	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA UUUAUGCA
5851	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU UAUGCAAG
5852	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU AUGCAAGU
5853	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUA UGCAAGUU
5861	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU AGGGUCUA
5862	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUA GGGUCUAU
5867	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC UAUGUAUU
5869	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA UGUAUUUA
5873	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA UUUAGGAU
5875	ACAUCCUA	CUGAUGA	X	GAA	AUACAUAG	CUAUGUAUU UAGGAUGU

5876	GACAUCCU CUGAUGA X GAA AAUACAUA	UAUGUAUUU AGGAUGUC
5877	AGACAUCC CUGAUGA X GAA AAAUACAU	AUGUAUUUA GGAUGUCU
5884	AAGGUGCA CUGAUGA X GAA ACAUCCUA	UAGGAUGUC UGCACCUU
5892	GGCUGCAG CUGAUGA X GAA AGGUGCAG	CUGCACCUU CUGCAGCC
5893	UGGCUGCA CUGAUGA X GAA AAGGUGCA	UGCACCUUC UGCAGCCA
5904	CAGCUUCU CUGAUGA X GAA ACUGGCUG	CAGCCAGUC AGAAGCUG
5930	GAAGCAGC CUGAUGA X GAA AUCCACUG	CAGUGGAUU GCUGCUUC
5937	UCCCCAAG CUGAUGA X GAA AGCAGCAA	UUGCUGCUU CUUGGGGA
5938	CUCCCCAA CUGAUGA X GAA AAGCAGCA	UGCUGCUUC UUGGGGAG
5940	UUCUCCCC CUGAUGA X GAA AGAAGCAG	CUGCUUCUU GGGGAGAA
5953	AGGAAGCA CUGAUGA X GAA ACUCUUCU	AGAAGAGUA UGCUUCCU
5958	AUAAAAGG CUGAUGA X GAA AGCAUACU	AGUAUGCUU CCUUUUAU
5959	GAUAAAAG CUGAUGA X GAA AAGCAUAC	GUAUGCUUC CUUUUAUC
5962	AUGGAUAA CUGAUGA X GAA AGGAAGCA	UGCUUCCUU UUAUCCAU
5963	CAUGGAUA CUGAUGA X GAA AAGGAAGC	GCUUCCUUU UAUCCAUG
5964	ACAUGGAU CUGAUGA X GAA AAAGGAAG	CUUCCUUUU AUCCAUGU
5965	UACAUGGA CUGAUGA X GAA AAAAGGAA	UUCCUUUUA UCCAUGUA
5967	AUUACAUG CUGAUGA X GAA AUAAAAGG	CCUUUUAUC CAUGUAAU
5973	AGUUAAAU CUGAUGA X GAA ACAUGGAU	AUCCAUGUA AUUUAACU
5976	UACAGUUA CUGAUGA X GAA AUUACAUG	CAUGUAAUU UAACUGUA
5977	CUACAGUU CUGAUGA X GAA AAUUACAU	AUGUAAUUU AACUGUAG
5978	UCUACAGU CUGAUGA X GAA AAAUUACA	UGUAAUUUA ACUGUAGA
5984	UCAGGUUC CUGAUGA X GAA ACAGUUAA	UUAACUGUA GAACCUGA
5996	GUUACUUA CUGAUGA X GAA AGCUCAGG	CCUGAGCUC UAAGUAAC
5998	CGGUUACU CUGAUGA X GAA AGAGCUCA	UGAGCUCUA AGUAACCG
6002	UCUUCGGU CUGAUGA X GAA ACUUAGAG	CUCUAAGUA ACCGAAGA
6015	CAGAGGCA CUGAUGA X GAA ACAUUCUU	AAGAAUGUA UGCCUCUG
6021	UAAGAACA CUGAUGA X GAA AGGCAUAC	GUAUGCCUC UGUUCUUA
6025	CACAUAAG CUGAUGA X GAA ACAGAGGC	GCCUCUGUU CUUAUGUG
6026	GCACAUAA CUGAUGA X GAA AACAGAGG	CCUCUGUUC UUAUGUGC
6028	UGGCACAU CUGAUGA X GAA AGAACAGA	UCUGUUCUU AUGUGCCA
6029	GUGGCACA CUGAUGA X GAA AAGAACAG	CUGUUCUUA UGUGCCAC
6040	UAAACAAG CUGAUGA X GAA AUGUGGCA	UGCCACAUC CUUGUUUA

6043	CUUUAAAC	CUGAUGA	X	GAA	AGGAUGUG	CACAUCCUU	GUUUAAAG
6046	AGCCUUUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAAAGGCU
6047	GAGCCUUU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AAAGGCUC
6048	AGAGCCUU	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	AAGGCUCU
6055	CAUACAGA	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC	UCUGUAUG
6057	UUCAUACA	CUGAUGA	X	GAA	AGAGCCUU	AAGGCUCUC	UGUAUGAA
6061	UCUCUUCA	CUGAUGA	X	GAA	ACAGAGAG	CUCUCUGUA	UGAAGAGA
6079	GUGCUGAU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUC	AUCAGCAC
6082	AAUGUGCU	CUGAUGA	X	GAA	AUGACGGU	ACCGUCAUC	AGCACAUU
6090	CACUAGGG	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUU	CCCUAGUG
6091	UCACUAGG	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUUC	CCUAGUGA
6095	AGGCUCAC	CUGAUGA	X	GAA	AGGGAAUG	CAUUCCCUA	GUGAGCCU
6104	GGAGCCAG	CUGAUGA	X	GAA	AGGCUCAC	GUGAGCCUA	CUGGCUCC
6111	GCUGCCAG	CUGAUGA	X	GAA	AGCCAGUA	UACUGGCUC	CUGGCAGC
6124	UUCCACAA	CUGAUGA	X	GAA	AGCCGCUG	CAGCGGCUU	UUGUGGAA
6125	CUUCCACA	CUGAUGA	X	GAA	AAGCCGCU	AGCGGCUUU	UGUGGAAG
6126	UCUUCCAC	CUGAUGA	X	GAA	AAAGCCGC	GCGGCUUUU	GUGGAAGA
6137	UGGCUAGU	CUGAUGA	X	GAA	AGUCUUCC	GGAAGACUC	ACUAGCCA
6141	CUUCUGGC	CUGAUGA	X	GAA	AGUGAGUC	GACUCACUA	GCCAGAAG
6166	GUGGAGAG	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUC	CUCUCCAC
6169	UUGGUGGA	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUC	UCCACCAA
6171	UCUUGGUG	CUGAUGA	X	GAA	AGAGGACU	AGUCCUCUC	CACCAAGA
6181	UGGAUUUA	CUGAUGA	X	GAA	AUCUUGGU	ACCAAGAUC	UAAAUCCA
6183	UUUGGAUU	CUGAUGA	X	GAA	AGAUCUUG	CAAGAUCUA	AAUCCAAA
6187	UUUGUUUG	CUGAUGA	X	GAA	AUUUAGAU	AUCUAAAUC	CAAACAAA
6204	UCUGGCUC	CUGAUGA	X	GAA	AGCCUGCU	AGCAGGCUA	GAGCCAGA
6226	ACAACAAA	CUGAUGA	X	GAA	AUUUGUCC	GGACAAAUC	UUUGUUGU
6228	GAACAACA	CUGAUGA	X	GAA	AGAUUUGU	ACAAAUCUU	UGUUGUUC
6229	GGAACAAC	CUGAUGA	X	GAA	AAGAUUUG	CAAAUCUUU	GUUGUUCC
6232	AGAGGAAC	CUGAUGA	X	GAA	ACAAAGAU	AUCUUUGUU	GUUCCUCU
6235	AGAAGAGG	CUGAUGA	X	GAA	ACAACAAA	UUUGUUGUU	CCUCUUCU
6236	AAGAAGAG	CUGAUGA	X	GAA	AACAACAA	UUGUUGUUC	CUCUUCUU
6239	GUAAAGAA	CUGAUGA	X	GAA	AGGAACAA	UUGUUCCUC	UUCUUUAC

6241	GUGUAAAG	CUGAUGA	X	GAA	AGAGGAAC	GUUCCUCUU	CUUUACAC
6242	UGUGUAAA	CUGAUGA	X	GAA	AAGAGGAA	UUCCUCUUC	UUUACACA
6244	UAUGUGUA	CUGAUGA	X	GAA	AGAAGAGG	CCUCUUCUU	UACACAUA
6245	GUAUGUGU	CUGAUGA	X	GAA	AAGAAGAG	CUCUUCUUU	ACACAUAC
6246	CGUAUGUG	CUGAUGA	X	GAA	AAAGAAGA	UCUUCUUUA	CACAUACG
6252	GGUUUGCG	CUGAUGA	X	GAA	AUGUGUAA	UUACACAUA	CGCAAACC
6280	AUUUAUAA	CUGAUGA	X	GAA	AUUGCCAG	CUGGCAAUU	UUAUAAAU
6281	GAUUUAUA	CUGAUGA	X	GAA	AAUUGCCA	UGGCAAUUU	UAUAAAUC
6282	UGAUUUAU	CUGAUGA	X	GAA	AAAUUGCC	GGCAAUUUU	AUAAAUCA
6283	CUGAUUUA	CUGAUGA	X	GAA	AAAAUUGC	GCAAUUUUA	UAAAUCAG
6285	ACCUGAUU	CUGAUGA	X	GAA	AUAAAAUU	AAUUUUAUA	AAUCAGGU
6289	AGUUACCU	CUGAUGA	X	GAA	AUUUAUAA	UUAUAAAUC	AGGUAACU
6294	CUUCCAGU	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	ACUGGAAG
6308	CUGAGUUU	CUGAUGA	X	GAA	ACCUCCUU	AAGGAGGUU	AAACUCAG
6309	UCUGAGUU	CUGAUGA	X	GAA	AACCUCCU	AGGAGGUUA	AACUCAGA
6314	UUUUUUCU	CUGAUGA	X	GAA	AGUUUAAC	GUUAAACUC	AGAAAAAA
6331	AAUUGACU	CUGAUGA	X	GAA	AGGUCUUC	GAAGACCUC	AGUCAAUU
6335	AGAGAAUU	CUGAUGA	X	GAA	ACUGAGGU	ACCUCAGUC	AAUUCUCU
6339	AAGUAGAG	CUGAUGA	X	GAA	AUUGACUG	CAGUCAAUU	CUCUACUU
6340	AAAGUAGA	CUGAUGA	X	GAA	AAUUGACU	AGUCAAUUC	UCUACUUU
6342	AAAAAGUA	CUGAUGA	X	GAA	AGAAUUGA	UCAAUUCUC	UACUUUUU
6344	AAAAAAAG	CUGAUGA	X	GAA	AGAGAAUU	AAUUCUCUA	CUUUUUUU
6347	AAAAAAAA	CUGAUGA	X	GAA	AGUAGAGA	UCUCUACUU	UUUUUUUU
6348	AAAAAAAA	CUGAUGA	X	GAA	AAGUAGAG	CUCUACUUU	UUUUUUUU
6349	AAAAAAAA	CUGAUGA	X	GAA	AAAGUAGA	UCUACUUUU	UUUUUUUU
6350	AAAAAAAA	CUGAUGA	X	GAA	AAAAGUAG	CUACUUUUU	UUUUUUUU
6351	AAAAAAAA	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUU	UUUUUUUU
6352	AAAAAAAA	CUGAUGA	X	GAA	AAAAAAGU	ACUUUUUUU	UUUUUUUU
6353	AAAAAAAA	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU	UUUUUUUU
6354	GAAAAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUUUUC
6355	GGAAAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUUUCC
6356	UGGAAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUUCCA
6357	UUGGAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUCCAA

6358	UUUGGAAA CUGAUGA X GAA AAAAAAAA	UUUUUUUUU UUUCCAAA
6359	AUUUGGAA CUGAUGA X GAA AAAAAAAA	UUUUUUUUU UUCCAAAU
6360	GAUUUGGA CUGAUGA X GAA AAAAAAAA	UUUUUUUUU UCCAAAUC
6361	UGAUUUGG CUGAUGA X GAA AAAAAAAA	UUUUUUUUU CCAAAUCA
6362	CUGAUUUG CUGAUGA X GAA AAAAAAAA	UUUUUUUUC CAAAUCAG
6368	UAUUAUCU CUGAUGA X GAA AUUUGGAA	UUCCAAAUC AGAUAAUA
6373	UGGGCUAU CUGAUGA X GAA AUCUGAUU	AAUCAGAUA AUAGCCCA
6376	UGCUGGGC CUGAUGA X GAA AUUAUCUG	CAGAUAAUA GCCCAGCA
6388	GUUAUCAC CUGAUGA X GAA AUUUGCUG	CAGCAAAUA GUGAUAAC
6394	UUAUUUGU CUGAUGA X GAA AUCACUAU	AUAGUGAUA ACAAAUAA
6401	UAAGGUUU CUGAUGA X GAA AUUUGUUA	UAACAAAUA AAACCUUA
6408	GAACAGCU CUGAUGA X GAA AGGUUUUA	UAAAACCUU AGCUGUUC
6409	UGAACAGC CUGAUGA X GAA AAGGUUUU	AAAACCUUA GCUGUUCA
6415	AAGACAUG CUGAUGA X GAA ACAGCUAA	UUAGCUGUU CAUGUCUU
6416	CAAGACAU CUGAUGA X GAA AACAGCUA	UAGCUGUUC AUGUCUUG
6421	GAAAUCAA CUGAUGA X GAA ACAUGAAC	GUUCAUGUC UUGAUUUC
6423	UUGAAAUC CUGAUGA X GAA AGACAUGA	UCAUGUCUU GAUUUCAA
6427	AUUAUUGA CUGAUGA X GAA AUCAAGAC	GUCUUGAUU UCAAUAAU
6428	AAUUAUUG CUGAUGA X GAA AAUCAAGA	UCUUGAUUU CAAUAAUU
6429	UAAUUAUU CUGAUGA X GAA AAAUCAAG	CUUGAUUUC AAUAAUUA
6433	GAAUUAAU CUGAUGA X GAA AUUGAAAU	AUUUCAAUA AUUAAUUC
6436	UAAGAAUU CUGAUGA X GAA AUUAUUGA	UCAAUAAUU AAUUCUUA
6437	UUAAGAAU CUGAUGA X GAA AAUUAUUG	CAAUAAUUA AUUCUUAA
6440	UGAUUAAG CUGAUGA X GAA AUUAAUUA	UAAUUAAUU CUUAAUCA
6441	AUGAUUAA CUGAUGA X GAA AAUUAAUU	AAUUAAUUC UUAAUCAU
6443	UAAUGAUU CUGAUGA X GAA AGAAUUAA	UUAAUUCUU AAUCAUUA
6444	UUAAUGAU CUGAUGA X GAA AAGAAUUA	UAAUUCUUA AUCAUUAA
6447	CUCUUAAU CUGAUGA X GAA AUUAAGAA	UUCUUAAUC AUUAAGAG
6450	GGUCUCUU CUGAUGA X GAA AUGAUUAA	UUAAUCAUU AAGAGACC
6451	UGGUCUCU CUGAUGA X GAA AAUGAUUA	UAAUCAUUA AGAGACCA
6461	GUAUUUAU CUGAUGA X GAA AUGGUCUC	GAGACCAUA AUAAAUAC
6464	GGAGUAUU CUGAUGA X GAA AUUAUGGU	ACCAUAAUA AAUACUCC
6468	AAAAGGAG CUGAUGA X GAA AUUUAUUA	UAAUAAAUA CUCCUUUU

6471	UUGAAAAG	CUGAUGA	X	GAA	AGUAUUUA	UAAAUACUC CUUUUCAA
6474	CUCUUGAA	CUGAUGA	X	GAA	AGGAGUAU	AUACUCCUU UUCAAGAG
6475	UCUCUUGA	CUGAUGA	X	GAA	AAGGAGUA	UACUCCUUU UCAAGAGA
6476	UUCUCUUG	CUGAUGA	X	GAA	AAAGGAGU	ACUCCUUUU CAAGAGAA
6477	UUUCUCUU	CUGAUGA	X	GAA	AAAAGGAG	CUCCUUUUC AAGAGAAA
6497	ACAAUUCU	CUGAUGA	X	GAA	AUGGUUUU	AAAACCAUU AGAAUUGU
6498	AACAAUUC	CUGAUGA	X	GAA	AAUGGUUU	AAACCAUUA GAAUUGUU
6503	UGAGUAAC	CUGAUGA	X	GAA	AUUCUAAU	AUUAGAAUU GUUACUCA
6506	AGCUGAGU	CUGAUGA	X	GAA	ACAAUUCU	AGAAUUGUU ACUCAGCU
6507	GAGCUGAG	CUGAUGA	X	GAA	AACAAUUC	GAAUUGUUA CUCAGCUC
6510	AAGGAGCU	CUGAUGA	X	GAA	AGUAACAA	UUGUUACUC AGCUCCUU
6515	GUUUGAAG	CUGAUGA	X	GAA	AGCUGAGU	ACUCAGCUC CUUCAAAC
6518	UGAGUUUG	CUGAUGA	X	GAA	AGGAGCUG	CAGCUCCUU CAAACUCA
6519	CUGAGUUU	CUGAUGA	X	GAA	AAGGAGCU	AGCUCCUUC AAACUCAG
6525	ACAAACCU	CUGAUGA	X	GAA	AGUUUGAA	UUCAAACUC AGGUUUGU
6530	AUGCUACA	CUGAUGA	X	GAA	ACCUGAGU	ACUCAGGUU UGUAGCAU
6531	UAUGCUAC	CUGAUGA	X	GAA	AACCUGAG	CUCAGGUUU GUAGCAUA
6534	AUGUAUGC	CUGAUGA	X	GAA	ACAAACCU	AGGUUUGUA GCAUACAU
6539	GACUCAUG	CUGAUGA	X	GAA	AUGCUACA	UGUAGCAUA CAUGAGUC
6547	GAUGGAUG	CUGAUGA	X	GAA	ACUCAUGU	ACAUGAGUC CAUCCAUC
6551	GACUGAUG	CUGAUGA	X	GAA	AUGGACUC	GAGUCCAUC CAUCAGUC
6555	CUUUGACU	CUGAUGA	X	GAA	AUGGAUGG	CCAUCCAUC AGUCAAAG
6559	CAUUCUUU	CUGAUGA	X	GAA	ACUGAUGG	CCAUCAGUC AAAGAAUG
6570	CCAGAUGG	CUGAUGA	X	GAA	ACCAUUCU	AGAAUGGUU CCAUCUGG
6571	UCCAGAUG	CUGAUGA	X	GAA	AACCAUUC	GAAUGGUUC CAUCUGGA
6575	AGACUCCA	CUGAUGA	X	GAA	AUGGAACC	GGUUCCAUC UGGAGUCU
6582	UACAUUAA	CUGAUGA	X	GAA	ACUCCAGA	UCUGGAGUC UUAAUGUA
6584	UCUACAUU	CUGAUGA	X	GAA	AGACUCCA	UGGAGUCUU AAUGUAGA
6585	UUCUACAU	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUA AUGUAGAA
6590	UUUCUUUC	CUGAUGA	X	GAA	ACAUUAAG	CUUAAUGUA GAAAGAAA
6609	AUUAUUAC	CUGAUGA	X	GAA	AGUCUCCA	UGGAGACUU GUAAUAAU
6612	CUCAUUAU	CUGAUGA	X	GAA	ACAAGUCU	AGACUUGUA AUAAUGAG
6615	UAGCUCAU	CUGAUGA	X	GAA	AUUACAAG	CUUGUAAUA AUGAGCUA

6623	UUUGUAAC	CUGAUGA	X	GAA	AGCUCAUU	AAUGAGCUA	GUUACAAA
6626	CACUUUGU	CUGAUGA	X	GAA	ACUAGCUC	GAGCUAGUU	ACAAAGUG
6627	GCACUUUG	CUGAUGA	X	GAA	AACUAGCU	AGCUAGUUA	CAAAGUGC
6637	UAAUGAAC	CUGAUGA	X	GAA	AGCACUUU	AAAGUGCUU	GUUCAUUA
6640	UUUUAAUG	CUGAUGA	X	GAA	ACAAGCAC	GUGCUUGUU	CAUUAAAA
6641	AUUUUAAU	CUGAUGA	X	GAA	AACAAGCA	UGCUUGUUC	AUUAAAAU
6644	GCUAUUUU	CUGAUGA	X	GAA	AUGAACAA	UUGUUCAUU	AAAAUAGC
6645	UGCUAUUU	CUGAUGA	X	GAA	AAUGAACA	UGUUCAUUA	AAAUAGCA
6650	UUCAGUGC	CUGAUGA	X	GAA	AUUUUAAU	AUUAAAAUA	GCACUGAA
6662	CAUGUUUC	CUGAUGA	X	GAA	AUUUUCAG	CUGAAAAUU	GAAACAUG
6674	UAUCAGUU	CUGAUGA	X	GAA	AUUCAUGU	ACAUGAAUU	AACUGAUA
6675	UUAUCAGU	CUGAUGA	X	GAA	AAUUCAUG	CAUGAAUUA	ACUGAUAA
6682	UGGAAUAU	CUGAUGA	X	GAA	AUCAGUUA	UAACUGAUA	AUAUUCCA
6685	GAUUGGAA	CUGAUGA	X	GAA	AUUAUCAG	CUGAUAAUA	UUCCAAUC
6687	AUGAUUGG	CUGAUGA	X	GAA	AUAUUAUC	GAUAAUAUU	CCAAUCAU
6688	AAUGAUUG	CUGAUGA	X	GAA	AAUAUUAU	AUAAUAUUC	CAAUCAUU
6693	UGGCAAAU	CUGAUGA	X	GAA	AUUGGAAU	AUUCCAAUC	AUUUGCCA
6696	AAAUGGCA	CUGAUGA	X	GAA	AUGAUUGG	CCAAUCAUU	UGCCAUUU
6697	UAAAUGGC	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUU	GCCAUUUA
6703	UUGUCAUA	CUGAUGA	X	GAA	AUGGCAAA	UUUGCCAUU	UAUGACAA
6704	UUUGUCAU	CUGAUGA	X	GAA	AAUGGCAA	UUGCCAUUU	AUGACAAA
6705	UUUUGUCA	CUGAUGA	X	GAA	AAAUGGCA	UGCCAUUUA	UGACAAAA
6719	UUAGUGCC	CUGAUGA	X	GAA	ACCAUUUU	AAAAUGGUU	GGCACUAA
6726	UUCUUUGU	CUGAUGA	X	GAA	AGUGCCAA	UUGGCACUA	ACAAAGAA
6743	CUGAAAGG	CUGAUGA	X	GAA	AGUGCUCG	CGAGCACUU	CCUUUCAG
6744	UCUGAAAG	CUGAUGA	X	GAA	AAGUGCUC	GAGCACUUC	CUUUCAGA
6747	AACUCUGA	CUGAUGA	X	GAA	AGGAAGUG	CACUUCCUU	UCAGAGUU
6748	AAACUCUG	CUGAUGA	X	GAA	AAGGAAGU	ACUUCCUUU	CAGAGUUU
6749	GAAACUCU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUC	AGAGUUUC
6755	AUCUCAGA	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	UCUGAGAU
6756	UAUCUCAG	CUGAUGA	X	GAA	AACUCUGA	UCAGAGUUU	CUGAGAUA
6757	UUAUCUCA	CUGAUGA	X	GAA	AAACUCUG	CAGAGUUUC	UGAGAUAA
6764	ACGUACAU	CUGAUGA	X	GAA	AUCUCAGA	UCUGAGAUA	AUGUACGU

6769	GUUCCACG CUGAUGA X GAA ACAUUAUC	GAUAAUGUA CGUGGAAC
6781	UCCACCCA CUGAUGA X GAA ACUGUUCC	GGAACAGUC UGGGUGGA
6814	AAGACACA CUGAUGA X GAA ACUUGCAC	GUGCAAGUC UGUGUCUU
6820	ACUGACAA CUGAUGA X GAA ACACAGAC	GUCUGUGUC UUGUCAGU
6822	GGACUGAC CUGAUGA X GAA AGACACAG	CUGUGUCUU GUCAGUCC
6825	CUUGGACU CUGAUGA X GAA ACAAGACA	UGUCUUGUC AGUCCAAG
6829	ACUUCUUG CUGAUGA X GAA ACUGACAA	UUGUCAGUC CAAGAAGU
6851	CUAAAAUU CUGAUGA X GAA ACAUCUCG	CGAGAUGUU AAUUUUAG
6852	CCUAAAAU CUGAUGA X GAA AACAUCUC	GAGAUGUUA AUUUUAGG
6855	GUCCCUAA CUGAUGA X GAA AUUAACAU	AUGUUAAUU UUAGGGAC
6856	GGUCCCUA CUGAUGA X GAA AAUUAACA	UGUUAAUUU UAGGGACC
6857	GGGUCCCU CUGAUGA X GAA AAAUUAAC	GUUAAUUUU AGGGACCC
6858	CGGGUCCC CUGAUGA X GAA AAAAUUAA	UUAAUUUUA GGGACCCG
6872	UAGGAAAC CUGAUGA X GAA AGGCACGG	CCGUGCCUU GUUUCCUA
6875	GGCUAGGA CUGAUGA X GAA ACAAGGCA	UGCCUUGUU UCCUAGCC
6876	GGGCUAGG CUGAUGA X GAA AACAAGGC	GCCUUGUUU CCUAGCCC
6877	UGGGCUAG CUGAUGA X GAA AAACAAGG	CCUUGUUUC CUAGCCCA
6880	UUGUGGGC CUGAUGA X GAA AGGAAACA	UGUUUCCUA GCCCACAA
6901	AUCUGUUU CUGAUGA X GAA AUGUUUGC	GCAAACAUC AAACAGAU
6910	CUAGCGAG CUGAUGA X GAA AUCUGUUU	AAACAGAUA CUCGCUAG
6913	AGGCUAGC CUGAUGA X GAA AGUAUCUG	CAGAUACUC GCUAGCCU
6917	AAUGAGGC CUGAUGA X GAA AGCGAGUA	UACUCGCUA GCCUCAUU
6922	AUUUAAAU CUGAUGA X GAA AGGCUAGC	GCUAGCCUC AUUUAAAU
6925	UCAAUUUA CUGAUGA X GAA AUGAGGCU	AGCCUCAUU UAAAUUGA
6926	AUCAAUUU CUGAUGA X GAA AAUGAGGC	GCCUCAUUU AAAUUGAU
6927	AAUCAAUU CUGAUGA X GAA AAAUGAGG	CCUCAUUUA AAUUGAUU
6931	CUUUAAUC CUGAUGA X GAA AUUUAAAU	AUUUAAAUU GAUUAAAG
6935	CCUCCUUU CUGAUGA X GAA AUCAAUUU	AAAUUGAUU AAAGGAGG
6936	UCCUCCUU CUGAUGA X GAA AAUCAAUU	AAUUGAUUA AAGGAGGA
6951	CGGCCAAA CUGAUGA X GAA AUGCACUC	GAGUGCAUC UUUGGCCG
6953	GUCGGCCA CUGAUGA X GAA AGAUGCAC	GUGCAUCUU UGGCCGAC
6954	UGUCGGCC CUGAUGA X GAA AAGAUGCA	UGCAUCUUU GGCCGACA
6970	CACACAGU CUGAUGA X GAA ACACCACU	AGUGGUGUA ACUGUGUG

7026	AACACACA	CUGAUGA	X	GAA	ACACCCAC	GUGGGUGUA UGUGUGUU
7034	AUGCACAA	CUGAUGA	X	GAA	ACACACAU	AUGUGUGUU UUGUGCAU
7035	UAUGCACA	CUGAUGA	X	GAA	AACACACA	UGUGUGUUU UGUGCAUA
7036	UUAUGCAC	CUGAUGA	X	GAA	AAACACAC	GUGUGUUUU GUGCAUAA
7043	UAAAUAGU	CUGAUGA	X	GAA	AUGCACAA	UUGUGCAUA ACUAUUUA
7047	UCCUUAAA	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA UUUAAGGA
7049	UUUCCUUA	CUGAUGA	X	GAA	AUAGUUAU	AUAACUAUU UAAGGAAA
7050	GUUUCCUU	CUGAUGA	X	GAA	AAUAGUUA	UAACUAUUU AAGGAAAC
7051	AGUUUCCU	CUGAUGA	X	GAA	AAAUAGUU	AACUAUUUA AGGAAACU
7065	AACUUUAA	CUGAUGA	X	GAA	AUUCCAGU	ACUGGAAUU UUAAAGUU
7066	UAACUUUA	CUGAUGA	X	GAA	AAUUCCAG	CUGGAAUUU UAAAGUUA
7067	GUAACUUU	CUGAUGA	X	GAA	AAAUUCCA	UGGAAUUUU AAAGUUAC
7068	AGUAACUU	CUGAUGA	X	GAA	AAAAUUCC	GGAAUUUUA AAGUUACU
7073	AUAAAAGU	CUGAUGA	X	GAA	ACUUUAAA	UUUAAAGUU ACUUUUAU
7074	UAUAAAAG	CUGAUGA	X	GAA	AACUUUAA	UUAAAGUUA CUUUUAUA
7077	UUGUAUAA	CUGAUGA	X	GAA	AGUAACUU	AAGUUACUU UUAUACAA
7078	UUUGUAUA	CUGAUGA	X	GAA	AAGUAACU	AGUUACUUU UAUACAAA
7079	GUUUGUAU	CUGAUGA	X	GAA	AAAGUAAC	GUUACUUUU AUACAAAC
7080	GGUUUGUA	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUA UACAAACC
7082	UUGGUUUG	CUGAUGA	X	GAA	AUAAAAGU	ACUUUUAUA CAAACCAA
7095	GUAGCAUA	CUGAUGA	X	GAA	AUUCUUGG	CCAAGAAUA UAUGCUAC
7097	CUGUAGCA	CUGAUGA	X	GAA	AUAUUCUU	AAGAAUAUA UGCUACAG
7102	UAUAUCUG	CUGAUGA	X	GAA	AGCAUAUA	UAUAUGCUA CAGAUAUA
7108	CUGUCUUA	CUGAUGA	X	GAA	AUCUGUAG	CUACAGAUA UAAGACAG
7110	GUCUGUCU	CUGAUGA	X	GAA	AUAUCUGU	ACAGAUAUA AGACAGAC
7124	UAGGACCA	CUGAUGA	X	GAA	ACCAUGUC	GACAUGGUU UGGUCCUA
7125	AUAGGACC	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUU GGUCCUAU
7129	AAAUAUAG	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUC CUAUAUUU
7132	UAGAAAUA	CUGAUGA	X	GAA	AGGACCAA	UUGGUCCUA UAUUUCUA
7134	ACUAGAAA	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUA UUUCUAGU
7136	UGACUAGA	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUU UCUAGUCA
7137	AUGACUAG	CUGAUGA	X	GAA	AAUAUAGG	CCUAUAUUU CUAGUCAU
7138	CAUGACUA	CUGAUGA	X	GAA	AAAUAUAG	CUAUAUUUC UAGUCAUG

7140	AUCAUGAC	CUGAUGA	X	GAA	AGAAAUAU	AUAUUUCUA	GUCAUGAU
7143	UUCAUCAU	CUGAUGA	X	GAA	ACUAGAAA	UUUCUAGUC	AUGAUGAA
7155	AUACAAAA	CUGAUGA	X	GAA	ACAUUCAU	AUGAAUGUA	UUUUGUAU
7157	GUAUACAA	CUGAUGA	X	GAA	AUACAUUC	GAAUGUAUU	UUGUAUAC
7158	GGUAUACA	CUGAUGA	X	GAA	AAUACAUU	AAUGUAUUU	UGUAUACC
7159	UGGUAUAC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUU	GUAUACCA
7162	AGAUGGUA	CUGAUGA	X	GAA	ACAAAAUA	UAUUUUGUA	UACCAUCU
7164	GAAGAUGG	CUGAUGA	X	GAA	AUACAAAA	UUUUGUAUA	CCAUCUUC
7169	UAUAUGAA	CUGAUGA	X	GAA	AUGGUAUA	UAUACCAUC	UUCAUAUA
7171	AUUAUAUG	CUGAUGA	X	GAA	AGAUGGUA	UACCAUCUU	CAUAUAAU
7172	UAUUAUAU	CUGAUGA	X	GAA	AAGAUGGU	ACCAUCUUC	AUAUAAUA
7175	GUAUAUUA	CUGAUGA	X	GAA	AUGAAGAU	AUCUUCAUA	UAAUAUAC
7177	AAGUAUAU	CUGAUGA	X	GAA	AUAUGAAG	CUUCAUAUA	AUAUACUU
7180	UUUAAGUA	CUGAUGA	X	GAA	AUUAUAUG	CAUAUAAUA	UACUUAAA
7182	UUUUUAAG	CUGAUGA	X	GAA	AUAUUAUA	UAUAAUAUA	CUUAAAAA
7185	AUAUUUUU	CUGAUGA	X	GAA	AGUAUAUU	AAUAUACUU	AAAAAUAU
7186	AAUAUUUU	CUGAUGA	X	GAA	AAGUAUAU	AUAUACUUA	AAAAUAUU
7192	UUAAGAAA	CUGAUGA	X	GAA	AUUUUUAA	UUAAAAAUA	UUUCUUAA
7194	AAUUAAGA	CUGAUGA	X	GAA	AUAUUUUU	AAAAAUAUU	UCUUAAUU
7195	CAAUUAAG	CUGAUGA	X	GAA	AAUAUUUU	AAAAUAUUU	CUUAAUUG
7196	CCAAUUAA	CUGAUGA	X	GAA	AAAUAUUU	AAAUAUUUC	UUAAUUGG
7198	UCCCAAUU	CUGAUGA	X	GAA	AGAAAUAU	AUAUUUCUU	AAUUGGGA
7199	AUCCCAAU	CUGAUGA	X	GAA	AAGAAAUA	UAUUUCUUA	AUUGGGAU
7202	CAAAUCCC	CUGAUGA	X	GAA	AUUAAGAA	UUCUUAAUU	GGGAUUUG
7208	CGAUUACA	CUGAUGA	X	GAA	AUCCCAAU	AUUGGGAUU	UGUAAUCG
7209	ACGAUUAC	CUGAUGA	X	GAA	AAUCCCAA	UUGGGAUUU	GUAAUCGU
7212	GGUACGAU	CUGAUGA	X	GAA	ACAAAUCC	GGAUUUGUA	AUCGUACC
7215	GUUGGUAC	CUGAUGA	X	GAA	AUUACAAA	UUUGUAAUC	GUACCAAC
7218	UAAGUUGG	CUGAUGA	X	GAA	ACGAUUAC	GUAAUCGUA	CCAACUUA
7225	UAUCAAUU	CUGAUGA	X	GAA	AGUUGGUA	UACCAACUU	AAUUGAUA
7226	UUAUCAAU	CUGAUGA	X	GAA	AAGUUGGU	ACCAACUUA	AUUGAUAA
7229	AGUUUAUC	CUGAUGA	X	GAA	AUUAAGUU	AACUUAAUU	GAUAAACU
7233	GCCAAGUU	CUGAUGA	X	GAA	AUCAAUUA	UAAUUGAUA	AACUUGGC

7238	CAGUUGCC	CUGAUGA	X	GAA AGUUUAUC	GAUAAACUU	GGCAACUG
7249	GAACAUAA	CUGAUGA	X	GAA AGCAGUUG	CAACUGCUU	UUAUGUUC
7250	AGAACAUA	CUGAUGA	X	GAA AAGCAGUU	AACUGCUUU	UAUGUUCU
7251	CAGAACAU	CUGAUGA	X	GAA AAAGCAGU	ACUGCUUUU	AUGUUCUG
7252	ACAGAACA	CUGAUGA	X	GAA AAAAGCAG	CUGCUUUUA	UGUUCUGU
7256	GGAGACAG	CUGAUGA	X	GAA ACAUAAAA	UUUUAUGUU	CUGUCUCC
7257	AGGAGACA	CUGAUGA	X	GAA AACAUAAA	UUUAUGUUC	UGUCUCCU
7261	UGGAAGGA	CUGAUGA	X	GAA ACAGAACA	UGUUCUGUC	UCCUUCCA
7263	UAUGGAAG	CUGAUGA	X	GAA AGACAGAA	UUCUGUCUC	CUUCCAUA
7266	AUUUAUGG	CUGAUGA	X	GAA AGGAGACA	UGUCUCCUU	CCAUAAAU
7267	AAUUUAUG	CUGAUGA	X	GAA AAGGAGAC	GUCUCCUUC	CAUAAAUU
7271	GAAAAAUU	CUGAUGA	X	GAA AUGGAAGG	CCUUCCAUA	AAUUUUUC
7275	UUUUGAAA	CUGAUGA	X	GAA AUUUAUGG	CCAUAAAUU	UUUCAAAA
7276	AUUUUGAA	CUGAUGA	X	GAA AAUUUAUG	CAUAAAUUU	UUCAAAAU
7277	UAUUUUGA	CUGAUGA	X	GAA AAAUUUAU	AUAAAUUUU	UCAAAAUA
7278	GUAUUUUG	CUGAUGA	X	GAA AAAAUUUA	UAAAUUUUU	CAAAAUAC
7279	AGUAUUUU	CUGAUGA	X	GAA AAAAAUUU	AAAUUUUUC	AAAAUACU
7285	UGAAUUAG	CUGAUGA	X	GAA AUUUUGAA	UUCAAAAUA	CUAAUUCA
7288	UGUUGAAU	CUGAUGA	X	GAA AGUAUUUU	AAAAUACUA	AUUCAACA
7291	CUUUGUUG	CUGAUGA	X	GAA AUUAGUAU	AUACUAAUU	CAACAAAG
7292	UCUUUGUU	CUGAUGA	X	GAA AAUUAGUA	UACUAAUUC	AACAAAGA
7308	AAAAAAAA	CUGAUGA	X	GAA AGCUUUUU	AAAAAGCUC	UUUUUUUU
7310	GGAAAAAA	CUGAUGA	X	GAA AGAGCUUU	AAAGCUCUU	UUUUUUCC
7311	AGGAAAAA	CUGAUGA	X	GAA AAGAGCUU	AAGCUCUUU	UUUUUCCU
7312	UAGGAAAA	CUGAUGA	X	GAA AAAGAGCU	AGCUCUUUU	UUUUCCUA
7313	UUAGGAAA	CUGAUGA	X	GAA AAAAGAGC	GCUCUUUUU	UUUCCUAA
7314	UUUAGGAA	CUGAUGA	X	GAA AAAAAGAG	CUCUUUUUU	UUCCUAAA
7315	UUUUAGGA	CUGAUGA	X	GAA AAAAAAGA	UCUUUUUUU	UCCUAAAA
7316	AUUUUAGG	CUGAUGA	X	GAA AAAAAAAG	CUUUUUUUU	CCUAAAAU
7317	UAUUUUAG	CUGAUGA	X	GAA AAAAAAAA	UUUUUUUUC	CUAAAAUA
7320	GUUUAUUU	CUGAUGA	X	GAA AGGAAAAA	UUUUUCCUA	AAAUAAAC
7325	UUUGAGUU	CUGAUGA	X	GAA AUUUUAGG	CCUAAAAUA	AACUCAAA
7330	AUAAAUUU	CUGAUGA	X	GAA AGUUUAUU	AAUAAACUC	AAAUUUAU

7335	CAAGGAUA	CUGAUGA	X	GAA	AUUUGAGU	ACUCAAAUU	UAUCCUUG
7336	ACAAGGAU	CUGAUGA	X	GAA	AAUUUGAG	CUCAAAUUU	AUCCUUGU
7337	AACAAGGA	CUGAUGA	X	GAA	AAAUUUGA	UCAAAUUUA	UCCUUGUU
7339	UAAACAAG	CUGAUGA	X	GAA	AUAAAUUU	AAAUUUAUC	CUUGUUUA
7342	CUCUAAAC	CUGAUGA	X	GAA	AGGAUAAA	UUUAUCCUU	GUUUAGAG
7345	CUGCUCUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAGAGCAG
7346	UCUGCUCU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AGAGCAGA
7347	CUCUGCUC	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	GAGCAGAG
7362	UUUUUCUU	CUGAUGA	X	GAA	AUUUUUCU	AGAAAAAUU	AAGAAAAA
7363	GUUUUUCU	CUGAUGA	X	GAA	AAUUUUUC	GAAAAAUUA	AGAAAAAC
7373	CCAUUUCA	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUU	UGAAAUGG
7374	ACCAUUUC	CUGAUGA	X	GAA	AAGUUUUU	AAAAACUUU	GAAAUGGU
7383	UUUUUUGA	CUGAUGA	X	GAA	ACCAUUUC	GAAAUGGUC	UCAAAAAA
7385	AAUUUUUU	CUGAUGA	X	GAA	AGACCAUU	AAUGGUCUC	AAAAAAUU
7393	UAUUUAGC	CUGAUGA	X	GAA	AUUUUUUG	CAAAAAAUU	GCUAAAUA
7397	AAAAUAUU	CUGAUGA	X	GAA	AGCAAUUU	AAAUUGCUA	AAUAUUUU
7401	AUUGAAAA	CUGAUGA	X	GAA	AUUUAGCA	UGCUAAAUA	UUUUCAAU
7403	CCAUUGAA	CUGAUGA	X	GAA	AUAUUUAG	CUAAAUAUU	UUCAAUGG
7404	UCCAUUGA	CUGAUGA	X	GAA	AAUAUUUA	UAAAUAUUU	UCAAUGGA
7405	UUCCAUUG	CUGAUGA	X	GAA	AAAUAUUU	AAAUAUUUU	CAAUGGAA
7406	UUUCCAUU	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	AAUGGAAA
7418	CUAACAUU	CUGAUGA	X	GAA	AGUUUUCC	GGAAAACUA	AAUGUUAG
7424	GCUAAACU	CUGAUGA	X	GAA	ACAUUUAG	CUAAAUGUU	AGUUUAGC
7425	AGCUAAAC	CUGAUGA	X	GAA	AACAUUUA	UAAAUGUUA	GUUUAGCU
7428	AUCAGCUA	CUGAUGA	X	GAA	ACUAACAU	AUGUUAGUU	UAGCUGAU
7429	AAUCAGCU	CUGAUGA	X	GAA	AACUAACA	UGUUAGUUU	AGCUGAUU
7430	CAAUCAGC	CUGAUGA	X	GAA	AAACUAAC	GUUAGUUUA	GCUGAUUG
7437	CCCCAUAC	CUGAUGA	X	GAA	AUCAGCUA	UAGCUGAUU	GUAUGGGG
7440	AAACCCCA	CUGAUGA	X	GAA	ACAAUCAG	CUGAUUGUA	UGGGGUUU
7447	GGUUCGAA	CUGAUGA	X	GAA	ACCCCAUA	UAUGGGGUU	UUCGAACC
7448	AGGUUCGA	CUGAUGA	X	GAA	AACCCCAU	AUGGGGUUU	UCGAACCU
7449	AAGGUUCG	CUGAUGA	X	GAA	AAACCCCA	UGGGGUUUU	CGAACCUU
7450	AAAGGUUC	CUGAUGA	X	GAA	AAAACCCC	GGGGUUUUC	GAACCUUU

7457	AAAAGUGA CUGAUGA X GAA AGGUUCGA	UCGAACCUU UCACUUUU
7458	AAAAAGUG CUGAUGA X GAA AAGGUUCG	CGAACCUUU CACUUUUU
7459	CAAAAAGU CUGAUGA X GAA AAAGGUUC	GAACCUUUC ACUUUUUG
7463	CAAACAAA CUGAUGA X GAA AGUGAAAG	CUUUCACUU UUUGUUUG
7464	ACAAACAA CUGAUGA X GAA AAGUGAAA	UUUCACUUU UUGUUUGU
7465	AACAAACA CUGAUGA X GAA AAAGUGAA	UUCACUUUU UGUUUGUU
7466	AAACAAAC CUGAUGA X GAA AAAAGUGA	UCACUUUUU GUUUGUUU
7469	GUAAAACA CUGAUGA X GAA ACAAAAAG	CUUUUUGUU UGUUUUAC
7470	GGUAAAAC CUGAUGA X GAA AACAAAAA	UUUUUGUUU GUUUUACC
7473	AUAGGUAA CUGAUGA X GAA ACAAACAA	UUGUUUGUU UUACCUAU
7474	AAUAGGUA CUGAUGA X GAA AACAAACA	UGUUUGUUU UACCUAUU
7475	AAAUAGGU CUGAUGA X GAA AAACAAAC	GUUUGUUUU ACCUAUUU
7476	GAAAUAGG CUGAUGA X GAA AAAACAAA	UUUGUUUUA CCUAUUUC
7480	UUGUGAAA CUGAUGA X GAA AGGUAAAA	UUUUACCUA UUUCACAA
7482	AGUUGUGA CUGAUGA X GAA AUAGGUAA	UUACCUAUU UCACAACU
7483	CAGUUGUG CUGAUGA X GAA AAUAGGUA	UACCUAUUU CACAACUG
7484	ACAGUUGU CUGAUGA X GAA AAAUAGGU	ACCUAUUUC ACAACUGU
7495	UGGCAAUU CUGAUGA X GAA ACACAGUU	AACUGUGUA AAUUGCCA
7499	UUAUUGGC CUGAUGA X GAA AUUUACAC	GUGUAAAUU GCCAAUAA
7506	ACAGGAAU CUGAUGA X GAA AUUGGCAA	UUGCCAAUA AUUCCUGU
7509	UGGACAGG CUGAUGA X GAA AUUAUUGG	CCAAUAAUU CCUGUCCA
7510	AUGGACAG CUGAUGA X GAA AAUUAUUG	CAAUAAUUC CUGUCCAU
7515	UUUUCAUG CUGAUGA X GAA ACAGGAAU	AUUCCUGUC CAUGAAAA
7531	CACUGGAU CUGAUGA X GAA AUUUGCAU	AUGCAAAUU AUCCAGUG
7532	ACACUGGA CUGAUGA X GAA AAUUUGCA	UGCAAAUUA UCCAGUGU
7534	CUACACUG CUGAUGA X GAA AUAAUUUG	CAAAUUAUC CAGUGUAG
7541	AAUAUAUC CUGAUGA X GAA ACACUGGA	UCCAGUGUA GAUAUAUU
7545	GUCAAAUA CUGAUGA X GAA AUCUACAC	GUGUAGAUA UAUUUGAC
7547	UGGUCAAA CUGAUGA X GAA AUAUCUAC	GUAGAUAUA UUUGACCA
7549	GAUGGUCA CUGAUGA X GAA AUAUAUCU	AGAUAUAUU UGACCAUC
7550	UGAUGGUC CUGAUGA X GAA AAUAUAUC	GAUAUAUUU GACCAUCA
7557	CAUAGGGU CUGAUGA X GAA AUGGUCAA	UUGACCAUC ACCCUAUG
7563	AAUAUCCA CUGAUGA X GAA AGGGUGAU	AUCACCCUA UGGAUAUU

7569	CUAGCCAA	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUA	UUGGCUAG
7571	AACUAGCC	CUGAUGA	X	GAA	AUAUCCAU	AUGGAUAUU	GGCUAGUU
7576	GGCAAAAC	CUGAUGA	X	GAA	AGCCAAUA	UAUUGGCUA	GUUUUGCC
7579	AAAGGCAA	CUGAUGA	X	GAA	ACUAGCCA	UGGCUAGUU	UUGCCUUU
7580	UAAAGGCA	CUGAUGA	X	GAA	AACUAGCC	GGCUAGUUU	UGCCUUUA
7581	AUAAAGGC	CUGAUGA	X	GAA	AAACUAGC	GCUAGUUUU	GCCUUUAU
7586	GCUUAAUA	CUGAUGA	X	GAA	AGGCAAAA	UUUUGCCUU	UAUUAAGC
7587	UGCUUAAU	CUGAUGA	X	GAA	AAGGCAAA	UUUGCCUUU	AUUAAGCA
7588	UUGCUUAA	CUGAUGA	X	GAA	AAAGGCAA	UUGCCUUUA	UUAAGCAA
7590	AUUUGCUU	CUGAUGA	X	GAA	AUAAAGGC	GCCUUUAUU	AAGCAAAU
7591	AAUUUGCU	CUGAUGA	X	GAA	AAUAAAGG	CCUUUAUUA	AGCAAAUU
7599	CUGAAAUG	CUGAUGA	X	GAA	AUUUGCUU	AAGCAAAUU	CAUUUCAG
7600	GCUGAAAU	CUGAUGA	X	GAA	AAUUUGCU	AGCAAAUUC	AUUUCAGC
7603	CAGGCUGA	CUGAUGA	X	GAA	AUGAAUUU	AAAUUCAUU	UCAGCCUG
7604	UCAGGCUG	CUGAUGA	X	GAA	AAUGAAUU	AAUUCAUUU	CAGCCUGA
7605	UUCAGGCU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUC	AGCCUGAA
7617	UAUAGGCA	CUGAUGA	X	GAA	ACAUUCAG	CUGAAUGUC	UGCCUAUA
7623	AGAAUAUA	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUA	UAUAUUCU
7625	AGAGAAUA	CUGAUGA	X	GAA	AUAGGCAG	CUGCCUAUA	UAUUCUCU
7627	GCAGAGAA	CUGAUGA	X	GAA	AUAUAGGC	GCCUAUAUA	UUCUCUGC
7629	GAGCAGAG	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU	CUCUGCUC
7630	AGAGCAGA	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUC	UCUGCUCU
7632	AAAGAGCA	CUGAUGA	X	GAA	AGAAUAUA	UAUAUUCUC	UGCUCUUU
7637	AAUACAAA	CUGAUGA	X	GAA	AGCAGAGA	UCUCUGCUC	UUUGUAUU
7639	AGAAUACA	CUGAUGA	X	GAA	AGAGCAGA	UCUGCUCUU	UGUAUUCU
7640	GAGAAUAC	CUGAUGA	X	GAA	AAGAGCAG	CUGCUCUUU	GUAUUCUC
7643	AAGGAGAA	CUGAUGA	X	GAA	ACAAAGAG	CUCUUUGUA	UUCUCCUU
7645	CAAAGGAG	CUGAUGA	X	GAA	AUACAAAG	CUUUGUAUU	CUCCUUUG
7646	UCAAAGGA	CUGAUGA	X	GAA	AAUACAAA	UUUGUAUUC	UCCUUUGA
7648	GUUCAAAG	CUGAUGA	X	GAA	AGAAUACA	UGUAUUCUC	CUUUGAAC
7651	CGGGUUCA	CUGAUGA	X	GAA	AGGAGAAU	AUUCUCCUU	UGAACCCG
7652	ACGGGUUC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUU	GAACCCGU
7661	GAUGUUUU	CUGAUGA	X	GAA	ACGGGUUC	GAACCCGUU	AAAACAUC

7662	GGAUGUUU	CUGAUGA	X	GAA	AACGGGUU	AACCCGUUA	AAACAUCC
7669	UGCCACAG	CUGAUGA	X	GAA	AUGUUUUA	UAAAACAUC	CUGUGGCA

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

Table III: Human *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt. Position	HP Ribozyme Sequence	Substrate
16	CGGGGAGG AGAA GAGAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUCUCG GCU CCUCCCCG
39	CCGCUCCG AGAA GCCGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCGGCG GCU CGGAGCGG
180	CCGCCAGA AGAA GUCCUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGGACG GAC UCUGGCGG
190	AACGACCC AGAA GCCAGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGGCG GCC GGGUCGUU
278	GCGCGCAC AGAA GGACCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGGUCCU GCU GUGCGCGC
290	GACAGCUG AGAA GCGCGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCGCGCU GCU CAGCUGUC
295	AAGCAGAC AGAA GAGCAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCUCA GCU GUCUGCUU
298	GAGAAGCA AGAA GCUGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCAGCU GUC UGCUUCUC
302	CUGUGAGA AGAA GACAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGUCU GCU UCUCACAG
420	CAUUUAUG AGAA GCUUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAAGCA GCC CAUAAAUG
486	CUUCCACA AGAA GAUUUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAAAUCU GCC UGUGGAAG
537	UUUGCUUG AGAA GUGUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAACACA GCU CAAGCAAA
565	AUAUUUGC AGAA GUAGAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUACA GCU GCAAAUAU
721	CGUAACCC AGAA GGGAAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUCCCU GCC GGGUUACG
786	CGUUUUCC AGAA GGGAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUCCCU GAU GGAAAACG
863	CUUCACAG AGAA GAAGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCUUCU GAC CUGUGAAG

1056	UUUUUUUC	AGAA	GGGUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUACCCU	GAU	GAAAAAAA
1301	GCCGGUAA	AGAA	GCUUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAAGCG	GUC	UUACCGGC
1310	UCAUAGAG	AGAA	GGUAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUACCG	GCU	CUCUAUGA
1389	AAAUAGCG	AGAA	GAUUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAAUCU	GCU	CGCUAUUU
1535	UUUCGUAA	AGAA	GGGGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACCCCA	GAU	UUACGAAA
1566	AGAGCCGG	AGAA	GGAAAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUUCCA	GAC	CCGGCUCU
1572	GGGUAGAG	AGAA	GGGUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGACCCG	GCU	CUCUACCC
1604	CGGUACAA	AGAA	GGAUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAUCCU	GAC	UUGUACCG
1824	AUUCUAGA	AGAA	GCCACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUGGCU	GAC	UCUAGAAU
1908	UUUGGCAC	AGAA	GUGAUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAUCACA	GAU	GUGCCAAA
1949	CUCCUUCC	AGAA	GCAUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAUGCC	GAC	GGAAGGAG
1973	CUGUGCAA	AGAA	GUUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAACU	GUC	UUGCACAG
2275	AGUGGUGG	AGAA	GCUGAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCAGCA	GUU	CCACCACU
2321	ACCAAGUG	AGAA	GAGGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCCUCA	GAU	CACUUGGU
2396	UUUCAAUA	AGAA	GCGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACGCU	GUU	UAUUGAAA
2490	GUUCCUUG	AGAA	GUGAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUCACU	GUU	CAAGGAAC
2525	UUAGAGUG	AGAA	GCUCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGAGCU	GAU	CACUCUAA
2625	GAUAGGUA	AGAA	GUCUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAGACU	GAC	UACCUAUC
2652	GGAACUUC	AGAA	GGGUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACCCA	GAU	GAAGUUCC

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2684	CAUAAGGG	AGAA	GCUCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGAGCG	GCU	CCCUUAUG
2816	CAGCCACA	AGAA	GGCACG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGUGCCG	GAC	UGUGGCUG
2873	GCUCAGUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GACUGAGC
2930	AGGCUCCC	AGAA	GGUUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAACCU	GCU	GGGAGCCU
2963	CAAUCACC	AGAA	GAGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCUCU	GAU	GGUGAUUG
3157	UUCCUGAA	AGAA	GGAGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCUCCG	GCU	UUCAGGAA
3207	UAGAAACC	AGAA	GAAUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAUUCU	GAC	GGUUUCUA
3211	CUUGUAGA	AGAA	GUCAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGACG	GUU	UCUACAAG
3245	UGUAAGAA	AGAA	GAUCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGAUCU	GAU	UUCUUACA
3256	CACUUGAA	AGAA	GUAAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUUACA	GUU	UUCAAGUG
3287	UUCUGGAA	AGAA	GGAACU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGUUCCU	GUC	UUCCAGAA
3402	CUCACAUA	AGAA	GGGUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAACCCC	GAU	UAUGUGAG
3580	CCUCAGGC	AGAA	GCAAAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUUUGCA	GUC	GCCUGAGG
3641	CCAGCAUG	AGAA	GAUAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUAUCA	GAU	CAUGCUGG
3655	UCUGUGCC	AGAA	GUCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGACU	GCU	GGCACAGA
3810	UCAGAGAA	AGAA	GGAGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACUCCU	GCC	UUCUCUGA
3846	AACUUCGG	AGAA	GAAAUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAUUUCA	GCU	CCGAAGUU
3873	CUGACAUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GAUGUCAG
3995	GAGAGGCC	AGAA	GAGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACUCU	GUU	GGCCUCUC

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4100	UGACAUCA AGAA GCCCCG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGGGGCU GUC UGAUGUCA
4104	CUGCUGAC AGAA GACAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGUCU GAU GUCAGCAG
4120	AUGGCAGA AGAA GGGCCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGCCCA GUU UCUGCCAU
4135	GUGCCCAC AGAA GGAAUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAUUCCA GCU GUGGGCAC
4210	GGGCGGGG AGAA GCACGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCGUGCU GCU CCCCGCCC
4217	AGUCUGGG AGAA GGGAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUCCCC GCC CCCAGACU
4224	GAGUUGUA AGAA GGGGGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCCCCA GAC UACAACUC
4382	CAAAAAGC AGAA GGCUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGCCA GCU GCUUUUUG
4385	UCACAAAA AGAA GCUGGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCAGCU GCU UUUUGUGA
4537	GGGGUUGG AGAA GGGAAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUCCCU GCU CCAACCCC
4573	CUCAAUCA AGAA GGUCCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGACCA GUU UGAUUGAG
4594	AUUGGGUG AGAA GUGCAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCACU GAU CACCCAAU
4628	GGCUGCAG AGAA GGCCCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGGCCA GCC CUGCAGCC
4636	GGGUUUUG AGAA GCAGGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCUGCA GCC CAAAACCC
4866	AGGGUCAG AGAA GGGAAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUCCCA GCU CUGACCCU
4871	GUAGAAGG AGAA GAGCUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGCUCU GAC CCUUCUAC
4905	CGCUGUCC AGAA GCUCCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGAGCA GAU GGACAGCG
5233	CUGUGCAA AGAA GAAUAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUUCU GUU UUGCACAG
5281	CUCCUCAG AGAA GCAUUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAUGCA GUC CUGAGGAG

5319	UUUCCUCC AGAA GCCCUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGGGCU GAU GGAGGAAA
5358	GGUAUAGA AGAA GGGUCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGACCCC GUC UCUAUACC
5392	UGGGUCCC AGAA GUGUUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAACACA GUU GGGACCCA
5563	UGAGUCCC AGAA GGAGAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUCCA GUU GGGACUCA
5622	AGUUUCAA AGAA GUUGAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCAACU GCU UUGAAACU
5738	UAGCAUCA AGAA GAGCCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGCUCU GUU UGAUGCUA
5838	UAGCAUCA AGAA GAGCCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGCUCU GUU UGAUGCUA
5933	CCCCAAGA AGAA GCAAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUUGCU GCU UCUUGGGG
6022	CACAUAAG AGAA GAGGCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCCUCU GUU CUUAUGUG
6120	UCCACAAA AGAA GCUGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCAGCG GCU UUUGUGGA
6163	GUGGAGAG AGAA GUCCCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGGACA GUC CUCUCCAC
6270	AAAUUGCC AGAA GUCACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUGACA GCU GGCAAUUU
6412	AAGACAUG AGAA GCUAAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUAGCU GUU CAUGUCUU
6511	UUUGAAGG AGAA GAGUAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUACUCA GCU CCUUCAAA
6778	UCCACCCA AGAA GUUCCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGAACA GUC UGGGUGGA
6826	ACUUCUUG AGAA GACAAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUGUCA GUC CAAGAAGU
7245	AACAUAAA AGAA GUUGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCAACU GCU UUUAUGUU
7258	UGGAAGGA AGAA GAACAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGUUCU GUC UCCUUCCA
7433	CCCAUACA AGAA GCUAAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUUAGCU GAU UGUAUGGG

95

96

7512	UUUUCAUG	AGAA	GGAAUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUUCCU	GUC	CAUGAAAA
7606	GACAUUCA	AGAA	GAAAUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAUUUCA	GCC	UGAAUGUC
7618	AAUAUAUA	AGAA	GACAUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUGUCU	GCC	UAUAUAUU
7633	AUACAAAG	AGAA	GAGAAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUCUCU	GCU	CUUUGUAU

Table IV: Human KDR VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Posi-tion	HH Ribozyme Sequence	Substrate
21	CACAGGGC CUGAUGA X GAA ACGGCCAG	CUGGCCGUC GCCCUGUG
33	UCCACGCA CUGAUGA X GAA AGCCACAG	CUGUGGCUC UGCGUGGA
56	AACCCACA CUGAUGA X GAA AGGCGGCC	GGCCGCCUC UGUGGGUU
64	ACUAGGCA CUGAUGA X GAA ACCCACAG	CUGUGGGUU UGCCUAGU
65	CACUAGGC CUGAUGA X GAA AACCCACA	UGUGGGUUU GCCUAGUG
70	AGAAACAC CUGAUGA X GAA AGGCAAAC	GUUUGCCUA GUGUUUCU
75	UCAAGAGA CUGAUGA X GAA ACACUAGG	CCUAGUGUU UCUCUUGA
76	AUCAAGAG CUGAUGA X GAA AACACUAG	CUAGUGUUU CUCUUGAU
77	GAUCAAGA CUGAUGA X GAA AAACACUA	UAGUGUUUC UCUUGAUC
79	CAGAUCAA CUGAUGA X GAA AGAAACAC	GUGUUUCUC UUGAUCUG
81	GGCAGAUC CUGAUGA X GAA AGAGAAAC	GUUUCUCUU GAUCUGCC
85	CCUGGGCA CUGAUGA X GAA AUCAAGAG	CUCUUGAUC UGCCCAGG
96	UGUAUGCU CUGAUGA X GAA AGCCUGGG	CCCAGGCUC AGCAUACA
102	UCUUUUUG CUGAUGA X GAA AUGCUGAG	CUCAGCAUA CAAAAAGA
114	AUUGUAAG CUGAUGA X GAA AUGUCUUU	AAAGACAUA CUUACAAU
117	UUAAUUGU CUGAUGA X GAA AGUAUGUC	GACAUACUU ACAAUUAA
118	CUUAAUUG CUGAUGA X GAA AAGUAUGU	ACAUACUUA CAAUUAAG
123	UUAGCCUU CUGAUGA X GAA AUUGUAAG	CUUACAAUU AAGGCUAA
124	AUUAGCCU CUGAUGA X GAA AAUUGUAA	UUACAAUUA AGGCUAAU
130	AGUUGUAU CUGAUGA X GAA AGCCUUAA	UUAAGGCUA AUACAACU
133	AAGAGUUG CUGAUGA X GAA AUUAGCCU	AGGCUAAUA CAACUCUU
139	AAUUUGAA CUGAUGA X GAA AGUUGUAU	AUACAACUC UUCAAAUU
141	GUAAUUUG CUGAUGA X GAA AGAGUUGU	ACAACUCUU CAAAUUAC
142	AGUAAUUU CUGAUGA X GAA AAGAGUUG	CAACUCUUC AAAUUACU
147	CUGCAAGU CUGAUGA X GAA AUUUGAAG	CUUCAAAUU ACUUGCAG
148	CCUGCAAG CUGAUGA X GAA AAUUUGAA	UUCAAAUUA CUUGCAGG
151	UCCCCUGC CUGAUGA X GAA AGUAAUUU	AAAUUACUU GCAGGGGA

170	GCCAGUCC	CUGAUGA	X	GAA	AGUCCCUC	GAGGGACUU	GGACUGGC
180	UUGGGCCA	CUGAUGA	X	GAA	AGCCAGUC	GACUGGCUU	UGGCCCAA
181	AUUGGGCC	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUU	GGCCCAAU
190	ACUCUGAU	CUGAUGA	X	GAA	AUUGGGCC	GGCCCAAUA	AUCAGAGU
193	GCCACUCU	CUGAUGA	X	GAA	AUUAUUGG	CCAAUAAUC	AGAGUGGC
243	UUACAGAA	CUGAUGA	X	GAA	AGGCCAUC	GAUGGCCUC	UUCUGUAA
245	UCUUACAG	CUGAUGA	X	GAA	AGAGGCCA	UGGCCUCUU	CUGUAAGA
246	GUCUUACA	CUGAUGA	X	GAA	AAGAGGCC	GGCCUCUUC	UGUAAGAC
250	GAGUGUCU	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUA	AGACACUC
258	GGAAUUGU	CUGAUGA	X	GAA	AGUGUCUU	AAGACACUC	ACAAUUCC
264	ACUUUUGG	CUGAUGA	X	GAA	AUUGUGAG	CUCACAAUU	CCAAAAGU
265	CACUUUUG	CUGAUGA	X	GAA	AAUUGUGA	UCACAAUUC	CAAAAGUG
276	UCAUUUCC	CUGAUGA	X	GAA	AUCACUUU	AAAGUGAUC	GGAAAUGA
296	AGCACUUG	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	CAAGUGCU
305	CCCGGUAG	CUGAUGA	X	GAA	AGCACUUG	CAAGUGCUU	CUACCGGG
306	UCCCGGUA	CUGAUGA	X	GAA	AAGCACUU	AAGUGCUUC	UACCGGGA
308	UUUCCCGG	CUGAUGA	X	GAA	AGAAGCAC	GUGCUUCUA	CCGGGAAA
323	CCGAGGCC	CUGAUGA	X	GAA	AGUCAGUU	AACUGACUU	GGCCUCGG
329	AAAUGACC	CUGAUGA	X	GAA	AGGCCAAG	CUUGGCCUC	GGUCAUUU
333	ACAUAAAU	CUGAUGA	X	GAA	ACCGAGGC	GCCUCGGUC	AUUUAUGU
336	UAGACAUA	CUGAUGA	X	GAA	AUGACCGA	UCGGUCAUU	UAUGUCUA
337	AUAGACAU	CUGAUGA	X	GAA	AAUGACCG	CGGUCAUUU	AUGUCUAU
338	CAUAGACA	CUGAUGA	X	GAA	AAAUGACC	GGUCAUUUA	UGUCUAUG
342	UGAACAUA	CUGAUGA	X	GAA	ACAUAAAU	AUUUAUGUC	UAUGUUCA
344	CUUGAACA	CUGAUGA	X	GAA	AGACAUAA	UUAUGUCUA	UGUUCAAG
348	UAAUCUUG	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUU	CAAGAUUA
349	GUAAUCUU	CUGAUGA	X	GAA	AACAUAGA	UCUAUGUUC	AAGAUUAC
355	AGAUCUGU	CUGAUGA	X	GAA	AUCUUGAA	UUCAAGAUU	ACAGAUCU
356	GAGAUCUG	CUGAUGA	X	GAA	AAUCUUGA	UCAAGAUUA	CAGAUCUC
362	UAAAUGGA	CUGAUGA	X	GAA	AUCUGUAA	UUACAGAUC	UCCAUUUA
364	AAUAAAUG	CUGAUGA	X	GAA	AGAUCUGU	ACAGAUCUC	CAUUUAUU
368	AAGCAAUA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUU	UAUUGCUU
369	GAAGCAAU	CUGAUGA	X	GAA	AAUGGAGA	UCUCCAUUU	AUUGCUUC

370	AGAAGCAA	CUGAUGA	X	GAA	AAAUGGAG	CUCCAUUUA	UUGCUUCU
372	ACAGAAGC	CUGAUGA	X	GAA	AUAAAUGG	CCAUUUAUU	GCUUCUGU
376	ACUAACAG	CUGAUGA	X	GAA	AGCAAUAA	UUAUUGCUU	CUGUUAGU
377	CACUAACA	CUGAUGA	X	GAA	AAGCAAUA	UAUUGCUUC	UGUUAGUG
381	UGGUCACU	CUGAUGA	X	GAA	ACAGAAGC	GCUUCUGUU	AGUGACCA
382	UUGGUCAC	CUGAUGA	X	GAA	AACAGAAG	CUUCUGUUA	GUGACCAA
399	AUGUACAC	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUC	GUGUACAU
404	CAGUAAUG	CUGAUGA	X	GAA	ACACGACU	AGUCGUGUA	CAUUACUG
408	UUCUCAGU	CUGAUGA	X	GAA	AUGUACAC	GUGUACAUU	ACUGAGAA
409	GUUCUCAG	CUGAUGA	X	GAA	AAUGUACA	UGUACAUUA	CUGAGAAC
438	AGACAUGG	CUGAUGA	X	GAA	AUCACCAC	GUGGUGAUU	CCAUGUCU
439	GAGACAUG	CUGAUGA	X	GAA	AAUCACCA	UGGUGAUUC	CAUGUCUC
445	GGACCCGA	CUGAUGA	X	GAA	ACAUGGAA	UUCCAUGUC	UCGGGUCC
447	AUGGACCC	CUGAUGA	X	GAA	AGACAUGG	CCAUGUCUC	GGGUCCAU
452	UUGAAAUG	CUGAUGA	X	GAA	ACCCGAGA	UCUCGGGUC	CAUUUCAA
456	AGAUUUGA	CUGAUGA	X	GAA	AUGGACCC	GGGUCCAUU	UCAAAUCU
457	GAGAUUUG	CUGAUGA	X	GAA	AAUGGACC	GGUCCAUUU	CAAAUCUC
458	UGAGAUUU	CUGAUGA	X	GAA	AAAUGGAC	GUCCAUUUC	AAAUCUCA
463	CACGUUGA	CUGAUGA	X	GAA	AUUUGAAA	UUUCAAAUC	UCAACGUG
465	GACACGUU	CUGAUGA	X	GAA	AGAUUUGA	UCAAAUCUC	AACGUGUC
473	CACAAAGU	CUGAUGA	X	GAA	ACACGUUG	CAACGUGUC	ACUUUGUG
477	CUUGCACA	CUGAUGA	X	GAA	AGUGACAC	GUGUCACUU	UGUGCAAG
478	UCUUGCAC	CUGAUGA	X	GAA	AAGUGACA	UGUCACUUU	GUGCAAGA
488	UUUCUGGG	CUGAUGA	X	GAA	AUCUUGCA	UGCAAGAUA	CCCAGAAA
503	CAGGAACA	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUU	UGUUCCUG
504	UCAGGAAC	CUGAUGA	X	GAA	AAUCUCUU	AAGAGAUUU	GUUCCUGA
507	CCAUCAGG	CUGAUGA	X	GAA	ACAAAUCU	AGAUUUGUU	CCUGAUGG
508	ACCAUCAG	CUGAUGA	X	GAA	AACAAAUC	GAUUUGUUC	CUGAUGGU
517	AAUUCUGU	CUGAUGA	X	GAA	ACCAUCAG	CUGAUGGUA	ACAGAAUU
525	UCCCAGGA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	UCCUGGGA
526	GUCCCAGG	CUGAUGA	X	GAA	AAUUCUGU	ACAGAAUUU	CCUGGGAC
527	UGUCCCAG	CUGAUGA	X	GAA	AAAUUCUG	CAGAAUUUC	CUGGGACA
548	GAAUAGUA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUU	UACUAUUC

549	GGAAUAGU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUU	ACUAUUCC
550	GGGAAUAG	CUGAUGA	X	GAA	AAAGCCCU	AGGGCUUUA	CUAUUCCC
553	GCUGGGAA	CUGAUGA	X	GAA	AGUAAAGC	GCUUUACUA	UUCCCAGC
555	UAGCUGGG	CUGAUGA	X	GAA	AUAGUAAA	UUUACUAUU	CCCAGCUA
556	GUAGCUGG	CUGAUGA	X	GAA	AAUAGUAA	UUACUAUUC	CCAGCUAC
563	UGAUCAUG	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUA	CAUGAUCA
570	GCAUAGCU	CUGAUGA	X	GAA	AUCAUGUA	UACAUGAUC	AGCUAUGC
575	UGCCAGCA	CUGAUGA	X	GAA	AGCUGAUC	GAUCAGCUA	UGCUGGCA
588	UCACAGAA	CUGAUGA	X	GAA	ACCAUGCC	GGCAUGGUC	UUCUGUGA
590	CUUCACAG	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUU	CUGUGAAG
591	GCUUCACA	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUC	UGUGAAGC
606	UCAUCAUU	CUGAUGA	X	GAA	AUUUUUGC	GCAAAAAUU	AAUGAUGA
607	UUCAUCAU	CUGAUGA	X	GAA	AAUUUUUG	CAAAAAUUA	AUGAUGAA
619	AGACUGGU	CUGAUGA	X	GAA	ACUUUCAU	AUGAAAGUU	ACCAGUCU
620	UAGACUGG	CUGAUGA	X	GAA	AACUUUCA	UGAAAGUUA	CCAGUCUA
626	ACAUAAUA	CUGAUGA	X	GAA	ACUGGUAA	UUACCAGUC	UAUUAUGU
628	GUACAUAA	CUGAUGA	X	GAA	AGACUGGU	ACCAGUCUA	UUAUGUAC
630	AUGUACAU	CUGAUGA	X	GAA	AUAGACUG	CAGUCUAUU	AUGUACAU
631	UAUGUACA	CUGAUGA	X	GAA	AAUAGACU	AGUCUAUUA	UGUACAUA
635	CAACUAUG	CUGAUGA	X	GAA	ACAUAAUA	UAUUAUGUA	CAUAGUUG
639	ACGACAAC	CUGAUGA	X	GAA	AUGUACAU	AUGUACAUA	GUUGUCGU
642	ACAACGAC	CUGAUGA	X	GAA	ACUAUGUA	UACAUAGUU	GUCGUUGU
645	CCUACAAC	CUGAUGA	X	GAA	ACAACUAU	AUAGUUGUC	GUUGUAGG
648	UACCCUAC	CUGAUGA	X	GAA	ACGACAAC	GUUGUCGUU	GUAGGGUA
651	CUAUACCC	CUGAUGA	X	GAA	ACAACGAC	GUCGUUGUA	GGGUAUAG
656	AAAUCCUA	CUGAUGA	X	GAA	ACCCUACA	UGUAGGGUA	UAGGAUUU
658	AUAAAUCC	CUGAUGA	X	GAA	AUACCCUA	UAGGGUAUA	GGAUUUAU
663	ACAUCAUA	CUGAUGA	X	GAA	AUCCUAUA	UAUAGGAUU	UAUGAUGU
664	CACAUCAU	CUGAUGA	X	GAA	AAUCCUAU	AUAGGAUUU	AUGAUGUG
665	CCACAUCA	CUGAUGA	X	GAA	AAAUCCUA	UAGGAUUUA	UGAUGUGG
675	GGACUCAG	CUGAUGA	X	GAA	ACCACAUC	GAUGUGGUU	CUGAGUCC
676	CGGACUCA	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUC	UGAGUCCG
682	AUGAGACG	CUGAUGA	X	GAA	ACUCAGAA	UUCUGAGUC	CGUCUCAU

686	UUCCAUGA	CUGAUGA	X	GAA	ACGGACUC	GAGUCCGUC	UCAUGGAA
688	AAUUCCAU	CUGAUGA	X	GAA	AGACGGAC	GUCCGUCUC	AUGGAAUU
696	GAUAGUUC	CUGAUGA	X	GAA	AUUCCAUG	CAUGGAAUU	GAACUAUC
702	CCAACAGA	CUGAUGA	X	GAA	AGUUCAAU	AUUGAACUA	UCUGUUGG
704	CUCCAACA	CUGAUGA	X	GAA	AUAGUUCA	UGAACUAUC	UGUUGGAG
708	UUUUCUCC	CUGAUGA	X	GAA	ACAGAUAG	CUAUCUGUU	GGAGAAAA
720	UUUAAGAC	CUGAUGA	X	GAA	AGCUUUUC	GAAAAGCUU	GUCUUAAA
723	CAAUUUAA	CUGAUGA	X	GAA	ACAAGCUU	AAGCUUGUC	UUAAAUUG
725	UACAAUUU	CUGAUGA	X	GAA	AGACAAGC	GCUUGUCUU	AAAUUGUA
726	GUACAAUU	CUGAUGA	X	GAA	AAGACAAG	CUUGUCUUA	AAUUGUAC
730	UGCUGUAC	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUU	GUACAGCA
733	UCUUGCUG	CUGAUGA	X	GAA	ACAAUUUA	UAAAUUGUA	CAGCAAGA
750	CCCACAUU	CUGAUGA	X	GAA	AGUUCAGU	ACUGAACUA	AAUGUGGG
762	UUGAAGUC	CUGAUGA	X	GAA	AUCCCCAC	GUGGGGAUU	GACUUCAA
767	CCCAGUUG	CUGAUGA	X	GAA	AGUCAAUC	GAUUGACUU	CAACUGGG
768	UCCCAGUU	CUGAUGA	X	GAA	AAGUCAAU	AUUGACUUC	AACUGGGA
779	AAGAAGGG	CUGAUGA	X	GAA	AUUCCCAG	CUGGGAAUA	CCCUUCUU
784	CUUCGAAG	CUGAUGA	X	GAA	AGGGUAUU	AAUACCCUU	CUUCGAAG
785	GCUUCGAA	CUGAUGA	X	GAA	AAGGGUAU	AUACCCUUC	UUCGAAGC
787	AUGCUUCG	CUGAUGA	X	GAA	AGAAGGGU	ACCCUUCUU	CGAAGCAU
788	GAUGCUUC	CUGAUGA	X	GAA	AAGAAGGG	CCCUUCUUC	GAAGCAUC
796	CUUAUGCU	CUGAUGA	X	GAA	AUGCUUCG	CGAAGCAUC	AGCAUAAG
802	AAGUUUCU	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUA	AGAAACUU
810	CGGUUUAC	CUGAUGA	X	GAA	AGUUUCUU	AAGAAACUU	GUAAACCG
813	UCUCGGUU	CUGAUGA	X	GAA	ACAAGUUU	AAACUUGUA	AACCGAGA
825	UGGGUUUU	CUGAUGA	X	GAA	AGGUCUCG	CGAGACCUA	AAAACCCA
836	CACUCCCA	CUGAUGA	X	GAA	ACUGGGUU	AACCCAGUC	UGGGAGUG
857	UGCUCAAA	CUGAUGA	X	GAA	AUUUCUUC	GAAGAAAUU	UUUGAGCA
858	GUGCUCAA	CUGAUGA	X	GAA	AAUUUCUU	AAGAAAUUU	UUGAGCAC
859	GGUGCUCA	CUGAUGA	X	GAA	AAAUUUCU	AGAAAUUUU	UGAGCACC
860	AGGUGCUC	CUGAUGA	X	GAA	AAAAUUUC	GAAAUUUUU	GAGCACCU
869	CUAUAGUU	CUGAUGA	X	GAA	AGGUGCUC	GAGCACCUU	AACUAUAG
870	UCUAUAGU	CUGAUGA	X	GAA	AAGGUGCU	AGCACCUUA	ACUAUAGA

874	ACCAUCUA	CUGAUGA	X	GAA	AGUUAAGG	CCUUAACUA	UAGAUGGU
876	ACACCAUC	CUGAUGA	X	GAA	AUAGUUAA	UUAACUAUA	GAUGGUGU
885	CUCCGGGU	CUGAUGA	X	GAA	ACACCAUC	GAUGGUGUA	ACCCGGAG
905	AGGUGUAC	CUGAUGA	X	GAA	AUCCUUGG	CCAAGGAUU	GUACACCU
908	CACAGGUG	CUGAUGA	X	GAA	ACAAUCCU	AGGAUUGUA	CACCUGUG
923	GCCCACUG	CUGAUGA	X	GAA	AUGCUGCA	UGCAGCAUC	CAGUGGGC
956	CCCUGACA	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUU	UGUCAGGG
957	ACCCUGAC	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUUU	GUCAGGGU
960	UGGACCCU	CUGAUGA	X	GAA	ACAAAUGU	ACAUUUGUC	AGGGUCCA
966	UUUUCAUG	CUGAUGA	X	GAA	ACCCUGAC	GUCAGGGUC	CAUGAAAA
979	AGCAACAA	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUU	UUGUUGCU
980	AAGCAACA	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	UGUUGCUU
981	AAAGCAAC	CUGAUGA	X	GAA	AAAGGUUU	AAACCUUUU	GUUGCUUU
984	CCAAAAGC	CUGAUGA	X	GAA	ACAAAAGG	CCUUUUGUU	GCUUUUGG
988	ACUUCCAA	CUGAUGA	X	GAA	AGCAACAA	UUGUUGCUU	UUGGAAGU
989	CACUUCCA	CUGAUGA	X	GAA	AAGCAACA	UGUUGCUUU	UGGAAGUG
990	CCACUUCC	CUGAUGA	X	GAA	AAAGCAAC	GUUGCUUUU	GGAAGUGG
1007	CCACCAGA	CUGAUGA	X	GAA	AUUCCAUG	CAUGGAAUC	UCUGGUGG
1009	UUCCACCA	CUGAUGA	X	GAA	AGAUUCCA	UGGAAUCUC	UGGUGGAA
1038	GGGAUUCU	CUGAUGA	X	GAA	ACACGCUC	GAGCGUGUC	AGAAUCCC
1044	UUCGCAGG	CUGAUGA	X	GAA	AUUCUGAC	GUCAGAAUC	CCUGCGAA
1055	AACCAAGG	CUGAUGA	X	GAA	ACUUCGCA	UGCGAAGUA	CCUUGGUU
1059	GGGUAACC	CUGAUGA	X	GAA	AGGUACUU	AAGUACCUU	GGUUACCC
1063	GGGUGGGU	CUGAUGA	X	GAA	ACCAAGGU	ACCUUGGUU	ACCCACCC
1064	GGGGUGGG	CUGAUGA	X	GAA	AACCAAGG	CCUUGGUUA	CCCACCCC
1080	UACCAUUU	CUGAUGA	X	GAA	AUUUCUGG	CCAGAAAUA	AAAUGGUA
1088	CAUUUUUA	CUGAUGA	X	GAA	ACCAUUUU	AAAAUGGUA	UAAAAAUG
1090	UCCAUUUU	CUGAUGA	X	GAA	AUACCAUU	AAUGGUAUA	AAAAUGGA
1101	UCAAGGGG	CUGAUGA	X	GAA	AUUCCAUU	AAUGGAAUA	CCCCUUGA
1107	UUGGACUC	CUGAUGA	X	GAA	AGGGGUAU	AUACCCCUU	GAGUCCAA
1112	UGUGAUUG	CUGAUGA	X	GAA	ACUCAAGG	CCUUGAGUC	CAAUCACA
1117	AAUUGUGU	CUGAUGA	X	GAA	AUUGGACU	AGUCCAAUC	ACACAAUU
1125	CCCGCUUU	CUGAUGA	X	GAA	AUUGUGUG	CACACAAUU	AAAGCGGG

1126	CCCCGCUU CUGAUGA X GAA AAUUGUGU	ACACAAUUA AAGCGGGG
1140	AUCGUCAG CUGAUGA X GAA ACAUGCCC	GGGCAUGUA CUGACGAU
1149	ACUUCCAU CUGAUGA X GAA AUCGUCAG	CUGACGAUU AUGGAAGU
1150	CACUUCCA CUGAUGA X GAA AAUCGUCA	UGACGAUUA UGGAAGUG
1180	GACAGUGU CUGAUGA X GAA AUUUCCUG	CAGGAAAUU ACACUGUC
1181	UGACAGUG CUGAUGA X GAA AAUUUCCU	AGGAAAUUA CACUGUCA
1188	GUAAGGAU CUGAUGA X GAA ACAGUGUA	UACACUGUC AUCCUUAC
1191	UUGGUAAG CUGAUGA X GAA AUGACAGU	ACUGUCAUC CUUACCAA
1194	GGAUUGGU CUGAUGA X GAA AGGAUGAC	GUCAUCCUU ACCAAUCC
1195	GGGAUUGG CUGAUGA X GAA AAGGAUGA	UCAUCCUUA CCAAUCCC
1201	UGAAAUGG CUGAUGA X GAA AUUGGUAA	UUACCAAUC CCAUUUCA
1206	UCCUUUGA CUGAUGA X GAA AUGGGAUU	AAUCCCAUU UCAAAGGA
1207	CUCCUUUG CUGAUGA X GAA AAUGGGAU	AUCCCAUUU CAAAGGAG
1208	UCUCCUUU CUGAUGA X GAA AAAUGGGA	UCCCAUUUC AAAGGAGA
1233	ACCAGAGA CUGAUGA X GAA ACCACAUG	CAUGUGGUC UCUCUGGU
1235	CAACCAGA CUGAUGA X GAA AGACCACA	UGUGGUCUC UCUGGUUG
1237	CACAACCA CUGAUGA X GAA AGAGACCA	UGGUCUCUC UGGUUGUG
1242	ACAUACAC CUGAUGA X GAA ACCAGAGA	UCUCUGGUU GUGUAUGU
1247	GUGGGACA CUGAUGA X GAA ACACAACC	GGUUGUGUA UGUCCCAC
1251	UGGGGUGG CUGAUGA X GAA ACAUACAC	GUGUAUGUC CCACCCCA
1263	UUCUCACC CUGAUGA X GAA AUCUGGGG	CCCCAGAUU GGUGAGAA
1274	AGAUUAGA CUGAUGA X GAA AUUUCUCA	UGAGAAAUC UCUAAUCU
1276	AGAGAUUA CUGAUGA X GAA AGAUUUCU	AGAAAUCUC UAAUCUCU
1278	GGAGAGAU CUGAUGA X GAA AGAGAUUU	AAAUCUCUA AUCUCUCC
1281	ACAGGAGA CUGAUGA X GAA AUUAGAGA	UCUCUAAUC UCUCCUGU
1283	CCACAGGA CUGAUGA X GAA AGAUUAGA	UCUAAUCUC UCCUGUGG
1285	AUCCACAG CUGAUGA X GAA AGAGAUUA	UAAUCUCUC CUGUGGAU
1294	CUGGUAGG CUGAUGA X GAA AUCCACAG	CUGUGGAUU CCUACCAG
1295	ACUGGUAG CUGAUGA X GAA AAUCCACA	UGUGGAUUC CUACCAGU
1298	CGUACUGG CUGAUGA X GAA AGGAAUCC	GGAUUCCUA CCAGUACG
1304	UGGUGCCG CUGAUGA X GAA ACUGGUAG	CUACCAGUA CGGCACCA
1315	CAGCGUUU CUGAUGA X GAA AGUGGUGC	GCACCACUC AAACGCUG
1330	AUAGACCG CUGAUGA X GAA ACAUGUCA	UGACAUGUA CGGUCUAU

1335	AUGGCAUA CUGAUGA X GAA ACCGUACA	UGUACGGUC UAUGCCAU
1337	GAAUGGCA CUGAUGA X GAA AGACCGUA	UACGGUCUA UGCCAUUC
1344	GGGGGAGG CUGAUGA X GAA AUGGCAUA	UAUGCCAUU CCUCCCCC
1345	CGGGGGAG CUGAUGA X GAA AAUGGCAU	AUGCCAUUC CUCCCCCG
1348	AUGCGGGG CUGAUGA X GAA AGGAAUGG	CCAUUCCUC CCCCGCAU
1357	GUGGAUGU CUGAUGA X GAA AUGCGGGG	CCCCGCAUC ACAUCCAC
1362	UACCAGUG CUGAUGA X GAA AUGUGAUG	CAUCACAUC CACUGGUA
1370	ACUGCCAA CUGAUGA X GAA ACCAGUGG	CCACUGGUA UUGGCAGU
1372	CAACUGCC CUGAUGA X GAA AUACCAGU	ACUGGUAUU GGCAGUUG
1379	CUUCCUCC CUGAUGA X GAA ACUGCCAA	UUGGCAGUU GGAGGAAG
1416	GUCACUGA CUGAUGA X GAA ACAGCUUG	CAAGCUGUC UCAGUGAC
1418	UUGUCACU CUGAUGA X GAA AGACAGCU	AGCUGUCUC AGUGACAA
1433	CACAAGGG CUGAUGA X GAA AUGGGUUU	AAACCCAUA CCCUUGUG
1438	UUCUUCAC CUGAUGA X GAA AGGGUAUG	CAUACCCUU GUGAAGAA
1466	CUCCCUGG CUGAUGA X GAA AGUCCUCC	GGAGGACUU CCAGGGAG
1467	CCUCCCUG CUGAUGA X GAA AAGUCCUC	GAGGACUUC CAGGGAGG
1480	UUCAAUUU CUGAUGA X GAA AUUUCCUC	GAGGAAAUA AAAUUGAA
1485	UUAACUUC CUGAUGA X GAA AUUUUAUU	AAUAAAAUU GAAGUUAA
1491	UUUUUAUU CUGAUGA X GAA ACUUCAAU	AUUGAAGUU AAUAAAAA
1492	AUUUUUAU CUGAUGA X GAA AACUUCAA	UUGAAGUUA AUAAAAAU
1495	UUGAUUUU CUGAUGA X GAA AUUAACUU	AAGUUAAUA AAAAUCAA
1501	AGCAAAUU CUGAUGA X GAA AUUUUUAU	AUAAAAAUC AAUUUGCU
1505	UUAGAGCA CUGAUGA X GAA AUUGAUUU	AAAUCAAUU UGCUCUAA
1506	AUUAGAGC CUGAUGA X GAA AAUUGAUU	AAUCAAUUU GCUCUAAU
1510	UUCAAUUA CUGAUGA X GAA AGCAAAUU	AAUUUGCUC UAAUUGAA
1512	CCUUCAAU CUGAUGA X GAA AGAGCAAA	UUUGCUCUA AUUGAAGG
1515	UUUCCUUC CUGAUGA X GAA AUUAGAGC	GCUCUAAUU GAAGGAAA
1536	AGGGUACU CUGAUGA X GAA ACAGUUUU	AAAACUGUA AGUACCCU
1540	AACAAGGG CUGAUGA X GAA ACUUACAG	CUGUAAGUA CCCUUGUU
1545	UGGAUAAC CUGAUGA X GAA AGGGUACU	AGUACCCUU GUUAUCCA
1548	GCUUGGAU CUGAUGA X GAA ACAAGGGU	ACCCUUGUU AUCCAAGC
1549	CGCUUGGA CUGAUGA X GAA AACAAGGG	CCCUUGUUA UCCAAGCG
1551	GCCGCUUG CUGAUGA X GAA AUAACAAG	CUUGUUAUC CAAGCGGC

1568	ACAAAGCU	CUGAUGA	X	GAA	ACACAUUU	AAAUGUGUC AGCUUUGU
1573	UUUGUACA	CUGAUGA	X	GAA	AGCUGACA	UGUCAGCUU UGUACAAA
1574	AUUUGUAC	CUGAUGA	X	GAA	AAGCUGAC	GUCAGCUUU GUACAAAU
1577	CACAUUUG	CUGAUGA	X	GAA	ACAAAGCU	AGCUUUGUA CAAAUGUG
1593	ACUUUGUU	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC AACAAAGU
1602	CCUCUCCC	CUGAUGA	X	GAA	ACUUUGUU	AACAAAGUC GGGAGAGG
1623	UGGAAGGA	CUGAUGA	X	GAA	AUCACCCU	AGGGUGAUC UCCUUCCA
1625	CGUGGAAG	CUGAUGA	X	GAA	AGAUCACC	GGUGAUCUC CUUCCACG
1628	UCACGUGG	CUGAUGA	X	GAA	AGGAGAUC	GAUCUCCUU CCACGUGA
1629	GUCACGUG	CUGAUGA	X	GAA	AAGGAGAU	AUCUCCUUC CACGUGAC
1645	AAUUUCAG	CUGAUGA	X	GAA	ACCCCUGG	CCAGGGGUC CUGAAAUU
1653	UGCAAAGU	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUU ACUUUGCA
1654	UUGCAAAG	CUGAUGA	X	GAA	AAUUUCAG	CUGAAAUUA CUUUGCAA
1657	AGGUUGCA	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU UGCAACCU
1658	CAGGUUGC	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUU GCAACCUG
1697	ACCACAAA	CUGAUGA	X	GAA	ACACGCUC	GAGCGUGUC UUUGUGGU
1699	GCACCACA	CUGAUGA	X	GAA	AGACACGC	GCGUGUCUU UGUGGUGC
1700	UGCACCAC	CUGAUGA	X	GAA	AAGACACG	CGUGUCUUU GUGGUGCA
1721	CAAACGUA	CUGAUGA	X	GAA	AUCUGUCU	AGACAGAUC UACGUUUG
1723	CUCAAACG	CUGAUGA	X	GAA	AGAUCUGU	ACAGAUCUA CGUUUGAG
1727	GGUUCUCA	CUGAUGA	X	GAA	ACGUAGAU	AUCUACGUU UGAGAACC
1728	AGGUUCUC	CUGAUGA	X	GAA	AACGUAGA	UCUACGUUU GAGAACCU
1737	UACCAUGU	CUGAUGA	X	GAA	AGGUUCUC	GAGAACCUC ACAUGGUA
1745	CAAGCUUG	CUGAUGA	X	GAA	ACCAUGUG	CACAUGGUA CAAGCUUG
1752	UGUGGGCC	CUGAUGA	X	GAA	AGCUUGUA	UACAAGCUU GGCCCACA
1765	GAUUGGCA	CUGAUGA	X	GAA	AGGCUGUG	CACAGCCUC UGCCAAUC
1773	CCCACAUG	CUGAUGA	X	GAA	AUUGGCAG	CUGCCAAUC CAUGUGGG
1787	GUGUGGGC	CUGAUGA	X	GAA	ACUCUCCC	GGGAGAGUU GCCCACAC
1800	UUCUUGCA	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUU UGCAAGAA
1801	GUUCUUGC	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU GCAAGAAC
1811	GAGUAUCC	CUGAUGA	X	GAA	AGUUCUUG	CAAGAACUU GGAUACUC
1816	CCAAAGAG	CUGAUGA	X	GAA	AUCCAAGU	ACUUGGAUA CUCUUUGG
1819	UUUCCAAA	CUGAUGA	X	GAA	AGUAUCCA	UGGAUACUC UUUGGAAA

1821	AAUUUCCA	CUGAUGA	X	GAA	AGAGUAUC	GAUACUCUU	UGGAAAUU
1822	CAAUUUCC	CUGAUGA	X	GAA	AAGAGUAU	AUACUCUUU	GGAAAUUG
1829	UGGCAUUC	CUGAUGA	X	GAA	AUUUCCAA	UUGGAAAUU	GAAUGCCA
1844	UAUUAGAG	CUGAUGA	X	GAA	ACAUGGUG	CACCAUGUU	CUCUAAUA
1845	CUAUUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUC	UCUAAUAG
1847	UGCUAUUA	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	UAAUAGCA
1849	UGUGCUAU	CUGAUGA	X	GAA	AGAGAACA	UGUUCUCUA	AUAGCACA
1852	AUUUGUGC	CUGAUGA	X	GAA	AUUAGAGA	UCUCUAAUA	GCACAAAU
1866	AUGAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUU	UUGAUCAU
1867	CAUGAUCA	CUGAUGA	X	GAA	AAUGUCAU	AUGACAUUU	UGAUCAUG
1868	CCAUGAUC	CUGAUGA	X	GAA	AAAUGUCA	UGACAUUUU	GAUCAUGG
1872	AGCUCCAU	CUGAUGA	X	GAA	AUCAAAAU	AUUUUGAUC	AUGGAGCU
1881	GCAUUCUU	CUGAUGA	X	GAA	AGCUCCAU	AUGGAGCUU	AAGAAUGC
1882	UGCAUUCU	CUGAUGA	X	GAA	AAGCUCCA	UGGAGCUUA	AGAAUGCA
1892	CCUGCAAG	CUGAUGA	X	GAA	AUGCAUUC	GAAUGCAUC	CUUGCAGG
1895	GGUCCUGC	CUGAUGA	X	GAA	AGGAUGCA	UGCAUCCUU	GCAGGACC
1913	GGCAGACA	CUGAUGA	X	GAA	AGUCUCCU	AGGAGACUA	UGUCUGCC
1917	GCAAGGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUC	UGCCUUGC
1923	UCUUGAGC	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUU	GCUCAAGA
1927	CCUGUCUU	CUGAUGA	X	GAA	AGCAAGGC	GCCUUGCUC	AAGACAGG
1954	GACCACGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCGUGGUC
1962	AGCUGCCU	CUGAUGA	X	GAA	ACCACGCA	UGCGUGGUC	AGGCAGCU
1971	AGGACUGU	CUGAUGA	X	GAA	AGCUGCCU	AGGCAGCUC	ACAGUCCU
1977	CGCUCUAG	CUGAUGA	X	GAA	ACUGUGAG	CUCACAGUC	CUAGAGCG
1980	ACACGCUC	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUA	GAGCGUGU
2001	UUUCCUGU	CUGAUGA	X	GAA	AUCGUGGG	CCCACGAUC	ACAGGAAA
2020	UGUCGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACGACA
2032	UUCCCCAA	CUGAUGA	X	GAA	ACUUGUCG	CGACAAGUA	UUGGGGAA
2034	CUUUCCCC	CUGAUGA	X	GAA	AUACUUGU	ACAAGUAUU	GGGGAAAG
2046	GAGACUUC	CUGAUGA	X	GAA	AUGCUUUC	GAAAGCAUC	GAAGUCUC
2052	GUGCAUGA	CUGAUGA	X	GAA	ACUUCGAU	AUCGAAGUC	UCAUGCAC
2054	CCGUGCAU	CUGAUGA	X	GAA	AGACUUCG	CGAAGUCUC	AUGCACGG
2066	GAUUCCCA	CUGAUGA	X	GAA	AUGCCGUG	CACGGCAUC	UGGGAAUC

2074	UGGAGGGG CUGAUGA X GAA AUUCCCAG	CUGGGAAUC CCCCUCCA
2080	GAUCUGUG CUGAUGA X GAA AGGGGGAU	AUCCCCCUC CACAGAUC
2088	AACCACAU CUGAUGA X GAA AUCUGUGG	CCACAGAUC AUGUGGUU
2096	UAUCUUUA CUGAUGA X GAA ACCACAUG	CAUGUGGUU UAAAGAUA
2097	UUAUCUUU CUGAUGA X GAA AACCACAU	AUGUGGUUU AAAGAUAA
2098	AUUAUCUU CUGAUGA X GAA AAACCACA	UGUGGUUUA AAGAUAAU
2104	GGUCUCAU CUGAUGA X GAA AUCUUUAA	UUAAAGAUA AUGAGACC
2115	UCUUCUAC CUGAUGA X GAA AGGGUCUC	GAGACCCUU GUAGAAGA
2118	GAGUCUUC CUGAUGA X GAA ACAAGGGU	ACCCUUGUA GAAGACUC
2126	CAAUGCCU CUGAUGA X GAA AGUCUUCU	AGAAGACUC AGGCAUUG
2133	UUCAAUAC CUGAUGA X GAA AUGCCUGA	UCAGGCAUU GUAUUGAA
2136	UCCUUCAA CUGAUGA X GAA ACAAUGCC	GGCAUUGUA UUGAAGGA
2138	CAUCCUUC CUGAUGA X GAA AUACAAUG	CAUUGUAUU GAAGGAUG
2160	CGGAUAGU CUGAUGA X GAA AGGUUCCG	CGGAACCUC ACUAUCCG
2164	UCUGCGGA CUGAUGA X GAA AGUGAGGU	ACCUCACUA UCCGCAGA
2166	ACUCUGCG CUGAUGA X GAA AUAGUGAG	CUCACUAUC CGCAGAGU
2196	CAGGUGUA CUGAUGA X GAA AGGCCUUC	GAAGGCCUC UACACCUG
2198	GGCAGGUG CUGAUGA X GAA AGAGGCCU	AGGCCUCUA CACCUGCC
2220	CAGCCAAG CUGAUGA X GAA ACACUGCA	UGCAGUGUU CUUGGCUG
2221	ACAGCCAA CUGAUGA X GAA AACACUGC	GCAGUGUUC UUGGCUGU
2223	GCACAGCC CUGAUGA X GAA AGAACACU	AGUGUUCUU GGCUGUGC
2246	UUAUGAAA CUGAUGA X GAA AUGCCUCC	GGAGGCAUU UUUCAUAA
2247	AUUAUGAA CUGAUGA X GAA AAUGCCUC	GAGGCAUUU UUCAUAAU
2248	UAUUAUGA CUGAUGA X GAA AAAUGCCU	AGGCAUUUU UCAUAAUA
2249	CUAUUAUG CUGAUGA X GAA AAAAUGCC	GGCAUUUUU CAUAAUAG
2250	UCUAUUAU CUGAUGA X GAA AAAAAUGC	GCAUUUUUC AUAAUAGA
2253	CCUUCUAU CUGAUGA X GAA AUGAAAAA	UUUUUCAUA AUAGAAGG
2256	GCACCUUC CUGAUGA X GAA AUUAUGAA	UUCAUAAUA GAAGGUGC
2282	UGAUUUCC CUGAUGA X GAA AGUUCGUC	GACGAACUU GGAAAUCA
2289	AGAAUAAU CUGAUGA X GAA AUUUCCAA	UUGGAAAUC AUUAUUCU
2292	ACUAGAAU CUGAUGA X GAA AUGAUUUC	GAAAUCAUU AUUCUAGU
2293	UACUAGAA CUGAUGA X GAA AAUGAUUU	AAAUCAUUA UUCUAGUA
2295	CCUACUAG CUGAUGA X GAA AUAAUGAU	AUCAUUAUU CUAGUAGG

2296	GCCUACUA	CUGAUGA	X	GAA	AAUAAUGA	UCAUUAUUC	UAGUAGGC
2298	GUGCCUAC	CUGAUGA	X	GAA	AGAAUAAU	AUUAUUCUA	GUAGGCAC
2301	GUCGUGCC	CUGAUGA	X	GAA	ACUAGAAU	AUUCUAGUA	GGCACGAC
2316	AACAUGGC	CUGAUGA	X	GAA	AUCACCGU	ACGGUGAUU	GCCAUGUU
2324	GCCAGAAG	CUGAUGA	X	GAA	ACAUGGCA	UGCCAUGUU	CUUCUGGC
2325	AGCCAGAA	CUGAUGA	X	GAA	AACAUGGC	GCCAUGUUC	UUCUGGCU
2327	GUAGCCAG	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUU	CUGGCUAC
2328	AGUAGCCA	CUGAUGA	X	GAA	AAGAACAU	AUGUUCUUC	UGGCUACU
2334	ACAAGAAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUA	CUUCUUGU
2337	AUGACAAG	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUU	CUUGUCAU
2338	GAUGACAA	CUGAUGA	X	GAA	AAGUAGCC	GGCUACUUC	UUGUCAUC
2340	AUGAUGAC	CUGAUGA	X	GAA	AGAAGUAG	CUACUUCUU	GUCAUCAU
2343	AGGAUGAU	CUGAUGA	X	GAA	ACAAGAAG	CUUCUUGUC	AUCAUCCU
2346	CCUAGGAU	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUC	AUCCUAGG
2349	GUCCCUAG	CUGAUGA	X	GAA	AUGAUGAC	GUCAUCAUC	CUAGGGAC
2352	ACGGUCCC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GGGACCGU
2361	GCCCGCUU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUU	AAGCGGGC
2362	GGCCCGCU	CUGAUGA	X	GAA	AACGGUCC	GGACCGUUA	AGCGGGCC
2396	UGGACAAG	CUGAUGA	X	GAA	AGCCUGUC	GACAGGCUA	CUUGUCCA
2399	CGAUGGAC	CUGAUGA	X	GAA	AGUAGCCU	AGGCUACUU	GUCCAUCG
2402	UGACGAUG	CUGAUGA	X	GAA	ACAAGUAG	CUACUUGUC	CAUCGUCA
2406	UCCAUGAC	CUGAUGA	X	GAA	AUGGACAA	UUGUCCAUC	GUCAUGGA
2409	GGAUCCAU	CUGAUGA	X	GAA	ACGAUGGA	UCCAUCGUC	AUGGAUCC
2416	UUCAUCUG	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUC	CAGAUGAA
2427	UCCAAUGG	CUGAUGA	X	GAA	AGUUCAUC	GAUGAACUC	CCAUUGGA
2432	GUUCAUCC	CUGAUGA	X	GAA	AUGGGAGU	ACUCCCAUU	GGAUGAAC
2443	UCGUUCAC	CUGAUGA	X	GAA	AUGUUCAU	AUGAACAUU	GUGAACGA
2458	GGCAUCAU	CUGAUGA	X	GAA	AGGCAGUC	GACUGCCUU	AUGAUGCC
2459	UGGCAUCA	CUGAUGA	X	GAA	AAGGCAGU	ACUGCCUUA	UGAUGCCA
2480	CUCUGGGG	CUGAUGA	X	GAA	AUUCCCAU	AUGGGAAUU	CCCCAGAG
2481	UCUCUGGG	CUGAUGA	X	GAA	AAUUCCCA	UGGGAAUUC	CCCAGAGA
2502	GGCUUACC	CUGAUGA	X	GAA	AGGUUCAG	CUGAACCUA	GGUAAGCC
2506	AAGAGGCU	CUGAUGA	X	GAA	ACCUAGGU	ACCUAGGUA	AGCCUCUU

2512	ACGGCCAA	CUGAUGA	X	GAA	AGGCUUAC	GUAAGCCUC UUGGCCGU
2514	CCACGGCC	CUGAUGA	X	GAA	AGAGGCUU	AAGCCUCUU GGCCGUGG
2528	CUUGGCCA	CUGAUGA	X	GAA	AGGCACCA	UGGUGCCUU UGGCCAAG
2529	UCUUGGCC	CUGAUGA	X	GAA	AAGGCACC	GGUGCCUUU GGCCAAGA
2541	UCUGCUUC	CUGAUGA	X	GAA	AUCUCUUG	CAAGAGAUU GAAGCAGA
2555	CAAUUCCA	CUGAUGA	X	GAA	AGGCAUCU	AGAUGCCUU UGGAAUUG
2556	UCAAUUCC	CUGAUGA	X	GAA	AAGGCAUC	GAUGCCUUU GGAAUUGA
2562	GUCUUGUC	CUGAUGA	X	GAA	AUUCCAAA	UUUGGAAUU GACAAGAC
2578	UGUCCUGC	CUGAUGA	X	GAA	AGUUGCUG	CAGCAACUU GCAGGACA
2589	UUGACUGC	CUGAUGA	X	GAA	ACUGUCCU	AGGACAGUA GCAGUCAA
2595	AACAUUUU	CUGAUGA	X	GAA	ACUGCUAC	GUAGCAGUC AAAAUGUU
2603	CUUCUUUC	CUGAUGA	X	GAA	ACAUUUUG	CAAAAUGUU GAAAGAAG
2632	GAGAGCUC	CUGAUGA	X	GAA	AUGCUCAC	GUGAGCAUC GAGCUCUC
2638	AGACAUGA	CUGAUGA	X	GAA	AGCUCGAU	AUCGAGCUC UCAUGUCU
2640	UCAGACAU	CUGAUGA	X	GAA	AGAGCUCG	CGAGCUCUC AUGUCUGA
2645	UGAGUUCA	CUGAUGA	X	GAA	ACAUGAGA	UCUCAUGUC UGAACUCA
2652	AGGAUCUU	CUGAUGA	X	GAA	AGUUCAGA	UCUGAACUC AAGAUCCU
2658	UGAAUGAG	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUC CUCAUUCA
2661	AUAUGAAU	CUGAUGA	X	GAA	AGGAUCUU	AAGAUCCUC AUUCAUAU
2664	CCAAUAUG	CUGAUGA	X	GAA	AUGAGGAU	AUCCUCAUU CAUAUUGG
2665	ACCAAUAU	CUGAUGA	X	GAA	AAUGAGGA	UCCUCAUUC AUAUUGGU
2668	GUGACCAA	CUGAUGA	X	GAA	AUGAAUGA	UCAUUCAUA UUGGUCAC
2670	UGGUGACC	CUGAUGA	X	GAA	AUAUGAAU	AUUCAUAUU GGUCACCA
2674	GAGAUGGU	CUGAUGA	X	GAA	ACCAAUAU	AUAUUGGUC ACCAUCUC
2680	CACAUUGA	CUGAUGA	X	GAA	AUGGUGAC	GUCACCAUC UCAAUGUG
2682	ACCACAUU	CUGAUGA	X	GAA	AGAUGGUG	CACCAUCUC AAUGUGGU
2691	AGAAGGUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUC AACCUUCU
2697	GCACCUAG	CUGAUGA	X	GAA	AGGUUGAC	GUCAACCUU CUAGGUGC
2698	GGCACCUA	CUGAUGA	X	GAA	AAGGUUGA	UCAACCUUC UAGGUGCC
2700	CAGGCACC	CUGAUGA	X	GAA	AGAAGGUU	AACCUUCUA GGUGCCUG
2710	UGGCUUGG	CUGAUGA	X	GAA	ACAGGCAC	GUGCCUGUA CCAAGCCA
2730	AUCACCAU	CUGAUGA	X	GAA	AGUGGCCC	GGGCCACUC AUGGUGAU
2739	AAUUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU GUGGAAUU

2747	AUUUGCAG CUGAUGA X GAA AUUCCACA	UGUGGAAUU CUGCAAAU
2748	AAUUUGCA CUGAUGA X GAA AAUUCCAC	GUGGAAUUC UGCAAAUU
2756	GGUUUCCA CUGAUGA X GAA AUUUGCAG	CUGCAAAUU UGGAAACC
2757	AGGUUUCC CUGAUGA X GAA AAUUUGCA	UGCAAAUUU GGAAACCU
2768	GGUAAGUG CUGAUGA X GAA ACAGGUUU	AAACCUGUC CACUUACC
2773	CCUCAGGU CUGAUGA X GAA AGUGGACA	UGUCCACUU ACCUGAGG
2774	UCCUCAGG CUGAUGA X GAA AAGUGGAC	GUCCACUUA CCUGAGGA
2798	AGGGGACA CUGAUGA X GAA AUUCAUUU	AAAUGAAUU UGUCCCCU
2799	UAGGGGAC CUGAUGA X GAA AAUUCAUU	AAUGAAUUU GUCCCCUA
2802	UUGUAGGG CUGAUGA X GAA ACAAAUUC	GAAUUUGUC CCCUACAA
2807	UGGUCUUG CUGAUGA X GAA AGGGGACA	UGUCCCCUA CAAGACCA
2828	CUUGACGG CUGAUGA X GAA AUCGUGCC	GGCACGAUU CCGUCAAG
2829	CCUUGACG CUGAUGA X GAA AAUCGUGC	GCACGAUUC CGUCAAGG
2833	UUUCCCUU CUGAUGA X GAA ACGGAAUC	GAUUCCGUC AAGGGAAA
2846	CUCCAACG CUGAUGA X GAA AGUCUUUC	GAAAGACUA CGUUGGAG
2850	AUUGCUCC CUGAUGA X GAA ACGUAGUC	GACUACGUU GGAGCAAU
2859	UCCACAGG CUGAUGA X GAA AUUGCUCC	GGAGCAAUC CCUGUGGA
2869	CCGUUUCA CUGAUGA X GAA AUCCACAG	CUGUGGAUC UGAAACGG
2882	UGCUGUCC CUGAUGA X GAA AGCGCCGU	ACGGCGCUU GGACAGCA
2892	CUACUGGU CUGAUGA X GAA AUGCUGUC	GACAGCAUC ACCAGUAG
2899	GCUCUGGC CUGAUGA X GAA ACUGGUGA	UCACCAGUA GCCAGAGC
2909	AGCUGGCU CUGAUGA X GAA AGCUCUGG	CCAGAGCUC AGCCAGCU
2918	CAAAUCCA CUGAUGA X GAA AGCUGGCU	AGCCAGCUC UGGAUUUG
2924	CCUCCACA CUGAUGA X GAA AUCCAGAG	CUCUGGAUU UGUGGAGG
2925	UCCUCCAC CUGAUGA X GAA AAUCCAGA	UCUGGAUUU GUGGAGGA
2939	CACUGAGG CUGAUGA X GAA ACUUCUCC	GGAGAAGUC CCUCAGUG
2943	ACAUCACU CUGAUGA X GAA AGGGACUU	AAGUCCCUC AGUGAUGU
2952	UCUUCUUC CUGAUGA X GAA ACAUCACU	AGUGAUGUA GAAGAAGA
2968	AUCUUCAG CUGAUGA X GAA AGCUUCCU	AGGAAGCUC CUGAAGAU
2977	CUUAUACA CUGAUGA X GAA AUCUUCAG	CUGAAGAUC UGUAUAAG
2981	AGUCCUUA CUGAUGA X GAA ACAGAUCU	AGAUCUGUA UAAGGACU
2983	GAAGUCCU CUGAUGA X GAA AUACAGAU	AUCUGUAUA AGGACUUC
2990	AGGUCAGG CUGAUGA X GAA AGUCCUUA	UAAGGACUU CCUGACCU

2991	AAGGUCAG CUGAUGA X GAA AAGUCCUU	AAGGACUUC CUGACCUU
2999	GAUGCUCC CUGAUGA X GAA AGGUCAGG	CCUGACCUU GGAGCAUC
3007	ACAGAUGA CUGAUGA X GAA AUGCUCCA	UGGAGCAUC UCAUCUGU
3009	UAACAGAU CUGAUGA X GAA AGAUGCUC	GAGCAUCUC AUCUGUUA
3012	CUGUAACA CUGAUGA X GAA AUGAGAUG	CAUCUCAUC UGUUACAG
3016	GAAGCUGU CUGAUGA X GAA ACAGAUGA	UCAUCUGUU ACAGCUUC
3017	GGAAGCUG CUGAUGA X GAA AACAGAUG	CAUCUGUUA CAGCUUCC
3023	CCACUUGG CUGAUGA X GAA AGCUGUAA	UUACAGCUU CCAAGUGG
3024	GCCACUUG CUGAUGA X GAA AAGCUGUA	UACAGCUUC CAAGUGGC
3034	CAUGCCCU CUGAUGA X GAA AGCCACUU	AAGUGGCUA AGGGCAUG
3047	AUGCCAAG CUGAUGA X GAA ACUCCAUG	CAUGGAGUU CUUGGCAU
3048	GAUGCCAA CUGAUGA X GAA AACUCCAU	AUGGAGUUC UUGGCAUC
3050	GCGAUGCC CUGAUGA X GAA AGAACUCC	GGAGUUCUU GGCAUCGC
3056	ACUUUCGC CUGAUGA X GAA AUGCCAAG	CUUGGCAUC GCGAAAGU
3067	CCUGUGGA CUGAUGA X GAA ACACUUUC	GAAAGUGUA UCCACAGG
3069	UCCCUGUG CUGAUGA X GAA AUACACUU	AAGUGUAUC CACAGGGA
3094	UAAGAGGA CUGAUGA X GAA AUUUCGUG	CACGAAAUA UCCUCUUA
3096	GAUAAGAG CUGAUGA X GAA AUAUUUCG	CGAAAUAUC CUCUUAUC
3099	UCCGAUAA CUGAUGA X GAA AGGAUAUU	AAUAUCCUC UUAUCGGA
3101	UCUCCGAU CUGAUGA X GAA AGAGGAUA	UAUCCUCUU AUCGGAGA
3102	UUCUCCGA CUGAUGA X GAA AAGAGGAU	AUCCUCUUA UCGGAGAA
3104	UCUUCUCC CUGAUGA X GAA AUAAGAGG	CCUCUUAUC GGAGAAGA
3120	CAGAUUUU CUGAUGA X GAA ACCACGUU	AACGUGGUU AAAAUCUG
3121	ACAGAUUU CUGAUGA X GAA AACCACGU	ACGUGGUUA AAAUCUGU
3126	AAGUCACA CUGAUGA X GAA AUUUUAAC	GUUAAAAUC UGUGACUU
3134	CCAAGCCA CUGAUGA X GAA AGUCACAG	CUGUGACUU UGGCUUGG
3135	GCCAAGCC CUGAUGA X GAA AAGUCACA	UGUGACUUU GGCUUGGC
3140	CCCGGGCC CUGAUGA X GAA AGCCAAAG	CUUUGGCUU GGCCCGGG
3151	UUUAUAAA CUGAUGA X GAA AUCCCGGG	CCCGGGAUA UUUAUAAA
3153	UCUUUAUA CUGAUGA X GAA AUAUCCCG	CGGGAUAUU UAUAAAGA
3154	AUCUUUAU CUGAUGA X GAA AAUAUCCC	GGGAUAUUU AUAAAGAU
3155	GAUCUUUA CUGAUGA X GAA AAAUAUCC	GGAUAUUUA UAAAGAUC
3157	UGGAUCUU CUGAUGA X GAA AUAAAUAU	AUAUUUAUA AAGAUCCA

3163	AUAAUCUG	CUGAUGA	X	GAA	AUCUUUAU	AUAAAGAUC	CAGAUUAU
3169	UCUGACAU	CUGAUGA	X	GAA	AUCUGGAU	AUCCAGAUU	AUGUCAGA
3170	UUCUGACA	CUGAUGA	X	GAA	AAUCUGGA	UCCAGAUUA	UGUCAGAA
3174	CCUUUUCU	CUGAUGA	X	GAA	ACAUAAUC	GAUUAUGUC	AGAAAAGG
3190	AGGGAGGC	CUGAUGA	X	GAA	AGCAUCUC	GAGAUGCUC	GCCUCCCU
3195	UUCAAAGG	CUGAUGA	X	GAA	AGGCGAGC	GCUCGCCUC	CCUUUGAA
3199	CCAUUUCA	CUGAUGA	X	GAA	AGGGAGGC	GCCUCCCUU	UGAAAUGG
3200	UCCAUUUC	CUGAUGA	X	GAA	AAGGGAGG	CCUCCCUUU	GAAAUGGA
3225	CUGUCAAA	CUGAUGA	X	GAA	AUUGUUUC	GAAACAAUU	UUUGACAG
3226	UCUGUCAA	CUGAUGA	X	GAA	AAUUGUUU	AAACAAUUU	UUGACAGA
3227	CUCUGUCA	CUGAUGA	X	GAA	AAAUUGUU	AACAAUUUU	UGACAGAG
3228	ACUCUGUC	CUGAUGA	X	GAA	AAAAUUGU	ACAAUUUUU	GACAGAGU
3239	GGAUUGUG	CUGAUGA	X	GAA	ACACUCUG	CAGAGUGUA	CACAAUCC
3246	UCACUCUG	CUGAUGA	X	GAA	AUUGUGUA	UACACAAUC	CAGAGUGA
3258	AAAGACCA	CUGAUGA	X	GAA	ACGUCACU	AGUGACGUC	UGGUCUUU
3263	CACCAAAA	CUGAUGA	X	GAA	ACCAGACG	CGUCUGGUC	UUUUGGUG
3265	AACACCAA	CUGAUGA	X	GAA	AGACCAGA	UCUGGUCUU	UUGGUGUU
3266	AAACACCA	CUGAUGA	X	GAA	AAGACCAG	CUGGUCUUU	UGGUGUUU
3267	AAAACACC	CUGAUGA	X	GAA	AAAGACCA	UGGUCUUUU	GGUGUUUU
3273	CACAGCAA	CUGAUGA	X	GAA	ACACCAAA	UUUGGUGUU	UUGCUGUG
3274	CCACAGCA	CUGAUGA	X	GAA	AACACCAA	UUGGUGUUU	UGCUGUGG
3275	CCCACAGC	CUGAUGA	X	GAA	AAACACCA	UGGUGUUUU	GCUGUGGG
3288	AAGGAAAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUA	UUUUCCUU
3290	CUAAGGAA	CUGAUGA	X	GAA	AUAUUUCC	GGAAAUAUU	UUCCUUAG
3291	CCUAAGGA	CUGAUGA	X	GAA	AAUAUUUC	GAAAUAUUU	UCCUUAGG
3292	ACCUAAGG	CUGAUGA	X	GAA	AAAUAUUU	AAAUAUUUU	CCUUAGGU
3293	CACCUAAG	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	CUUAGGUG
3296	AAGCACCU	CUGAUGA	X	GAA	AGGAAAAU	AUUUUCCUU	AGGUGCUU
3297	GAAGCACC	CUGAUGA	X	GAA	AAGGAAAA	UUUUCCUUA	GGUGCUUC
3304	AUAUGGAG	CUGAUGA	X	GAA	AGCACCUA	UAGGUGCUU	CUCCAUAU
3305	GAUAUGGA	CUGAUGA	X	GAA	AAGCACCU	AGGUGCUUC	UCCAUAUC
3307	AGGAUAUG	CUGAUGA	X	GAA	AGAAGCAC	GUGCUUCUC	CAUAUCCU
3311	CCCCAGGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCCUGGGG

3313	UACCCCAG CUGAUGA X GAA AUAUGGAG	CUCCAUAUC CUGGGGUA
3321	UCAAUCUU CUGAUGA X GAA ACCCCAGG	CCUGGGGUA AAGAUUGA
3327	UCUUCAUC CUGAUGA X GAA AUCUUUAC	GUAAAGAUU GAUGAAGA
3338	GCCUACAA CUGAUGA X GAA AUUCUUCA	UGAAGAAUU UUGUAGGC
3339	CGCCUACA CUGAUGA X GAA AAUUCUUC	GAAGAAUUU UGUAGGCG
3340	UCGCCUAC CUGAUGA X GAA AAAUUCUU	AAGAAUUUU GUAGGCGA
3343	CAAUCGCC CUGAUGA X GAA ACAAAAUU	AAUUUUGUA GGCGAUUG
3350	CUUCUUUC CUGAUGA X GAA AUCGCCUA	UAGGCGAUU GAAAGAAG
3364	CCUCAUUC CUGAUGA X GAA AGUUCCUU	AAGGAACUA GAAUGAGG
3382	UGUAGUAU CUGAUGA X GAA AUCAGGGG	CCCCUGAUU AUACUACA
3383	GUGUAGUA CUGAUGA X GAA AAUCAGGG	CCCUGAUUA UACUACAC
3385	UGGUGUAG CUGAUGA X GAA AUAAUCAG	CUGAUUAUA CUACACCA
3388	UUCUGGUG CUGAUGA X GAA AGUAUAAU	AUUAUACUA CACCAGAA
3401	UGGUCUGG CUGAUGA X GAA ACAUUUCU	AGAAAUGUA CCAGACCA
3439	GGGUCUCU CUGAUGA X GAA ACUGGGCU	AGCCCAGUC AGAGACCC
3452	ACUCUGAA CUGAUGA X GAA ACGUGGGU	ACCCACGUU UUCAGAGU
3453	AACUCUGA CUGAUGA X GAA AACGUGGG	CCCACGUUU UCAGAGUU
3454	CAACUCUG CUGAUGA X GAA AAACGUGG	CCACGUUUU CAGAGUUG
3455	CCAACUCU CUGAUGA X GAA AAAACGUG	CACGUUUUC AGAGUUGG
3461	GUUCCACC CUGAUGA X GAA ACUCUGAA	UUCAGAGUU GGUGGAAC
3472	AUUUCCCA CUGAUGA X GAA AUGUUCCA	UGGAACAUU UGGGAAAU
3473	GAUUUCCC CUGAUGA X GAA AAUGUUCC	GGAACAUUU GGGAAAUC
3481	UUGCAAGA CUGAUGA X GAA AUUUCCCA	UGGGAAAUC UCUUGCAA
3483	GCUUGCAA CUGAUGA X GAA AGAUUUCC	GGAAAUCUC UUGCAAGC
3485	UAGCUUGC CUGAUGA X GAA AGAGAUUU	AAAUCUCUU GCAAGCUA
3493	CUGAGCAU CUGAUGA X GAA AGCUUGCA	UGCAAGCUA AUGCUCAG
3499	AUCCUGCU CUGAUGA X GAA AGCAUUAG	CUAAUGCUC AGCAGGAU
3518	GAACAAUG CUGAUGA X GAA AGUCUUUG	CAAAGACUA CAUUGUUC
3522	GGAAGAAC CUGAUGA X GAA AUGUAGUC	GACUACAUU GUUCUUCC
3525	AUCGGAAG CUGAUGA X GAA ACAAUGUA	UACAUUGUU CUUCCGAU
3526	UAUCGGAA CUGAUGA X GAA AACAAUGU	ACAUUGUUC UUCCGAUA
3528	GAUAUCGG CUGAUGA X GAA AGAACAAU	AUUGUUCUU CCGAUAUC
3529	UGAUAUCG CUGAUGA X GAA AAGAACAA	UUGUUCUUC CGAUAUCA

3534	GUCUCUGA CUGAUGA X GAA AUCGGAAG	CUUCCGAUA UCAGAGAC
3536	AAGUCUCU CUGAUGA X GAA AUAUCGGA	UCCGAUAUC AGAGACUU
3544	CAUGCUCA CUGAUGA X GAA AGUCUCUG	CAGAGACUU UGAGCAUG
3545	CCAUGCUC CUGAUGA X GAA AAGUCUCU	AGAGACUUU GAGCAUGG
3562	GAGUCCAG CUGAUGA X GAA AUCCUCUU	AAGAGGAUU CUGGACUC
3563	AGAGUCCA CUGAUGA X GAA AAUCCUCU	AGAGGAUUC UGGACUCU
3570	GGCAGAGA CUGAUGA X GAA AGUCCAGA	UCUGGACUC UCUCUGCC
3572	UAGGCAGA CUGAUGA X GAA AGAGUCCA	UGGACUCUC UCUGCCUA
3574	GGUAGGCA CUGAUGA X GAA AGAGAGUC	GACUCUCUC UGCCUACC
3580	AGGUGAGG CUGAUGA X GAA AGGCAGAG	CUCUGCCUA CCUCACCU
3584	AAACAGGU CUGAUGA X GAA AGGUAGGC	GCCUACCUC ACCUGUUU
3591	AUACAGGA CUGAUGA X GAA ACAGGUGA	UCACCUGUU UCCUGUAU
3592	CAUACAGG CUGAUGA X GAA AACAGGUG	CACCUGUUU CCUGUAUG
3593	CCAUACAG CUGAUGA X GAA AAACAGGU	ACCUGUUUC CUGUAUGG
3598	CUCCUCCA CUGAUGA X GAA ACAGGAAA	UUUCCUGUA UGGAGGAG
3615	GGGUCACA CUGAUGA X GAA ACUUCCUC	GAGGAAGUA UGUGACCC
3629	CAUAAUGG CUGAUGA X GAA AUUUGGGG	CCCCAAAUU CCAUUAUG
3630	UCAUAAUG CUGAUGA X GAA AAUUUGGG	CCCAAAUUC CAUUAUGA
3634	GUUGUCAU CUGAUGA X GAA AUGGAAUU	AAUUCCAUU AUGACAAC
3635	UGUUGUCA CUGAUGA X GAA AAUGGAAU	AUUCCAUUA UGACAACA
3654	UACUGACU CUGAUGA X GAA AUUCCUGC	GCAGGAAUC AGUCAGUA
3658	CAGAUACU CUGAUGA X GAA ACUGAUUC	GAAUCAGUC AGUAUCUG
3662	UCUGCAGA CUGAUGA X GAA ACUGACUG	CAGUCAGUA UCUGCAGA
3664	GUUCUGCA CUGAUGA X GAA AUACUGAC	GUCAGUAUC UGCAGAAC
3676	CUUUCGCU CUGAUGA X GAA ACUGUUCU	AGAACAGUA AGCGAAAG
3702	AAUGUUUU CUGAUGA X GAA ACACUCAC	GUGAGUGUA AAAACAUU
3710	UAUCUUCA CUGAUGA X GAA AUGUUUUU	AAAAACAUU UGAAGAUA
3711	AUAUCUUC CUGAUGA X GAA AAUGUUUU	AAAACAUUU GAAGAUAU
3718	UAACGGGA CUGAUGA X GAA AUCUUCAA	UUGAAGAUA UCCCGUUA
3720	UCUAACGG CUGAUGA X GAA AUAUCUUC	GAAGAUAUC CCGUUAGA
3725	GUUCUUCU CUGAUGA X GAA ACGGGAUA	UAUCCCGUU AGAAGAAC
3726	GGUUCUUC CUGAUGA X GAA AACGGGAU	AUCCCGUUA GAAGAACC
3741	AUUACUUU CUGAUGA X GAA ACUUCUGG	CCAGAAGUA AAAGUAAU

3747	UCUGGGAU	CUGAUGA X GAA	ACUUUUAC	GUAAAAGUA	AUCCCAGA
3750	UCAUCUGG	CUGAUGA X GAA	AUUACUUU	AAAGUAAUC	CCAGAUGA
3778	AAGAACCA	CUGAUGA X GAA	ACCACUGU	ACAGUGGUA	UGGUUCUU
3783	GAGGCAAG	CUGAUGA X GAA	ACCAUACC	GGUAUGGUU	CUUGCCUC
3784	UGAGGCAA	CUGAUGA X GAA	AACCAUAC	GUAUGGUUC	UUGCCUCA
3786	UCUGAGGC	CUGAUGA X GAA	AGAACCAU	AUGGUUCUU	GCCUCAGA
3791	GCUCUUCU	CUGAUGA X GAA	AGGCAAGA	UCUUGCCUC	AGAAGAGC
3808	GUCUUCCA	CUGAUGA X GAA	AGUUUUCA	UGAAAACUU	UGGAAGAC
3809	UGUCUUCC	CUGAUGA X GAA	AAGUUUUC	GAAAACUUU	GGAAGACA
3827	AUGGAGAU	CUGAUGA X GAA	AUUUGGUU	AACCAAAUU	AUCUCCAU
3828	GAUGGAGA	CUGAUGA X GAA	AAUUUGGU	ACCAAAUUA	UCUCCAUC
3830	AAGAUGGA	CUGAUGA X GAA	AUAAUUUG	CAAAUUAUC	UCCAUCUU
3832	AAAAGAUG	CUGAUGA X GAA	AGAUAAUU	AAUUAUCUC	CAUCUUUU
3836	CACCAAAA	CUGAUGA X GAA	AUGGAGAU	AUCUCCAUC	UUUUGGUG
3838	UCCACCAA	CUGAUGA X GAA	AGAUGGAG	CUCCAUCUU	UUGGUGGA
3839	UUCCACCA	CUGAUGA X GAA	AAGAUGGA	UCCAUCUUU	UGGUGGAA
3840	AUUCCACC	CUGAUGA X GAA	AAAGAUGG	CCAUCUUUU	GGUGGAAU
3872	AUGCCACA	CUGAUGA X GAA	ACUCCCUG	CAGGGAGUC	UGUGGCAU
3881	AGCCUUCA	CUGAUGA X GAA	AUGCCACA	UGUGGCAUC	UGAAGGCU
3890	UCUGGUUU	CUGAUGA X GAA	AGCCUUCA	UGAAGGCUC	AAACCAGA
3908	CGGACUGG	CUGAUGA X GAA	AGCCGCUU	AAGCGGCUA	CCAGUCCG
3914	GAUAUCCG	CUGAUGA X GAA	ACUGGUAG	CUACCAGUC	CGGAUAUC
3920	CGGAGUGA	CUGAUGA X GAA	AUCCGGAC	GUCCGGAUA	UCACUCCG
3922	AUCGGAGU	CUGAUGA X GAA	AUAUCCGG	CCGGAUAUC	ACUCCGAU
3926	UGUCAUCG	CUGAUGA X GAA	AGUGAUAU	AUAUCACUC	CGAUGACA
3950	CACUGGAG	CUGAUGA X GAA	ACACGGUG	CACCGUGUA	CUCCAGUG
3953	CCUCACUG	CUGAUGA X GAA	AGUACACG	CGUGUACUC	CAGUGAGG
3972	AGCUUUAA	CUGAUGA X GAA	AGUUCUGC	GCAGAACUU	UUAAAGCU
3973	CAGCUUUA	CUGAUGA X GAA	AAGUUCUG	CAGAACUUU	UAAAGCUG
3974	UCAGCUUU	CUGAUGA X GAA	AAAGUUCU	AGAACUUUU	AAAGCUGA
3975	AUCAGCUU	CUGAUGA X GAA	AAAAGUUC	GAACUUUUA	AAGCUGAU
3984	CCAAUCUC	CUGAUGA X GAA	AUCAGCUU	AAGCUGAUA	GAGAUUGG
3990	UGCACUCC	CUGAUGA X GAA	AUCUCUAU	AUAGAGAUU	GGAGUGCA

4006	GGCUGUGC CUGAUGA X GAA ACCGGUUU	AAACCGGUA GCACAGCC
4020	GGCUGGAG CUGAUGA X GAA AUCUGGGC	GCCCAGAUU CUCCAGCC
4021	AGGCUGGA CUGAUGA X GAA AAUCUGGG	CCCAGAUUC UCCAGCCU
4023	UCAGGCUG CUGAUGA X GAA AGAAUCUG	CAGAUUCUC CAGCCUGA
4052	CAGGAGGA CUGAUGA X GAA AGCUCAGU	ACUGAGCUC UCCUCCUG
4054	AACAGGAG CUGAUGA X GAA AGAGCUCA	UGAGCUCUC CUCCUGUU
4057	UUAAACAG CUGAUGA X GAA AGGAGAGC	GCUCUCCUC CUGUUUAA
4062	UCCUUUUA CUGAUGA X GAA ACAGGAGG	CCUCCUGUU UAAAAGGA
4063	UUCCUUUU CUGAUGA X GAA AACAGGAG	CUCCUGUUU AAAAGGAA
4064	CUUCCUUU CUGAUGA X GAA AAACAGGA	UCCUGUUUA AAAGGAAG
4076	GGGGUGUG CUGAUGA X GAA AUGCUUCC	GGAAGCAUC CACACCCC
4089	AUGUCCGG CUGAUGA X GAA AGUUGGGG	CCCCAACUC CCGGACAU
4098	UCUCAUGU CUGAUGA X GAA AUGUCCGG	CCGGACAUC ACAUGAGA
4110	UCUGAGCA CUGAUGA X GAA ACCUCUCA	UGAGAGGUC UGCUCAGA
4115	CAAAAUCU CUGAUGA X GAA AGCAGACC	GGUCUGCUC AGAUUUUG
4120	CACUUCAA CUGAUGA X GAA AUCUGAGC	GCUCAGAUU UUGAAGUG
4121	ACACUUCA CUGAUGA X GAA AAUCUGAG	CUCAGAUUU UGAAGUGU
4122	AACACUUC CUGAUGA X GAA AAAUCUGA	UCAGAUUUU GAAGUGUU
4130	GAAAGAAC CUGAUGA X GAA ACACUUCA	UGAAGUGUU GUUCUUUC
4133	GUGGAAAG CUGAUGA X GAA ACAACACU	AGUGUUGUU CUUUCCAC
4134	GGUGGAAA CUGAUGA X GAA AACAACAC	GUGUUGUUC UUUCCACC
4136	CUGGUGGA CUGAUGA X GAA AGAACAAC	GUUGUUCUU UCCACCAG
4137	GCUGGUGG CUGAUGA X GAA AAGAACAA	UUGUUCUUU CCACCAGC
4138	UGCUGGUG CUGAUGA X GAA AAAGAACA	UGUUCUUUC CACCAGCA
4153	AAUGCGGC CUGAUGA X GAA ACUUCCUG	CAGGAAGUA GCCGCAUU
4161	GAAAAUCA CUGAUGA X GAA AUGCGGCU	AGCCGCAUU UGAUUUUC
4162	UGAAAAUC CUGAUGA X GAA AAUGCGGC	GCCGCAUUU GAUUUUCA
4166	GAAAUGAA CUGAUGA X GAA AUCAAAUG	CAUUUGAUU UUCAUUUC
4167	CGAAAUGA CUGAUGA X GAA AAUCAAAU	AUUUGAUUU UCAUUUCG
4168	UCGAAAUG CUGAUGA X GAA AAAUCAAA	UUUGAUUUU CAUUUCGA
4169	GUCGAAAU CUGAUGA X GAA AAAAUCAA	UUGAUUUUC AUUUCGAC
4172	GUUGUCGA CUGAUGA X GAA AUGAAAAU	AUUUUCAUU UCGACAAC
4173	UGUUGUCG CUGAUGA X GAA AAUGAAAA	UUUUCAUUU CGACAACA

4174	CUGUUGUC CUGAUGA X GAA AAAUGAAA	UUUCAUUUC GACAACAG
4194	UGCAGUCC CUGAUGA X GAA AGGUCCUU	AAGGACCUC GGACUGCA
4214	GCCUAGAA CUGAUGA X GAA AGCUGGCU	AGCCAGCUC UUCUAGGC
4216	AAGCCUAG CUGAUGA X GAA AGAGCUGG	CCAGCUCUU CUAGGCUU
4217	CAAGCCUA CUGAUGA X GAA AAGAGCUG	CAGCUCUUC UAGGCUUG
4219	CACAAGCC CUGAUGA X GAA AGAAGAGC	GCUCUUCUA GGCUUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

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Table V: Human KDR VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt. Position	Hairpin Ribozyme Sequence	Substrate
11	CGACGGCC AGAA GCACCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGUGCU GCU GGCCGUCG
18	CACAGGGC AGAA GCCAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGGCC GUC GCCCUGUG
51	CCCACAGA AGAA GCCCGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCGGGCC GCC UCUGUGGG
86	UGAGCCUG AGAA GAUCAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUGAUCU GCC CAGGCUCA
318	GAGGCCAA AGAA GUUUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAAACU GAC UUGGCCUC
358	AAAUGGAG AGAA GUAAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUUACA GAU CUCCAUUU
510	CUGUUACC AGAA GGAACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUCCU GAU GGUAACAG
623	ACAUAAUA AGAA GGUAAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUACCA GUC UAUUAUGU
683	UUCCAUGA AGAA GACUCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGUCC GUC UCAUGGAA
705	UUUUCUCC AGAA GAUAGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUAUCU GUU GGAGAAAA
833	CACUCCCA AGAA GGGUUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAACCCA GUC UGGGAGUG
932	UCUUGGUC AGAA GCCCAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGGGCU GAU GACCAAGA
1142	CCAUAAUC AGAA GUACAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGUACU GAC GAUUAUGG
1259	UCUCACCA AGAA GGGGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACCCCA GAU UGGUGAGA
1332	AUGGCAUA AGAA GUACAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGUACG GUC UAUGCCAU

1376	CUUCCUCC AGAA GCCAAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUGGCA GUU GGAGGAAG
1413	GUCACUGA AGAA GCUUGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAAGCU GUC UCAGUGAC
1569	UUGUACAA AGAA GACACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUGUCA GCU UUGUACAA
1673	GCUCAGUG AGAA GCAUGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACAUGCA GCC CACUGAGC
1717	AAACGUAG AGAA GUCUGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAGACA GAU CUACGUUU
1760	UUGGCAGA AGAA GUGGGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCCACA GCC UCUGCCAA
1797	UUCUUGCA AGAA GGUGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCU GUU UGCAAGAA
1918	UUGAGCAA AGAA GACAUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAUGUCU GCC UUGCUCAA
1967	GGACUGUG AGAA GCCUGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCAGGCA GCU CACAGUCC
1974	CGCUCUAG AGAA GUGAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUCACA GUC CUAGAGCG
2021	UACUUGUC AGAA GAUUCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAAUCA GAC GACAAGUA
2084	ACCACAUG AGAA GUGGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCACA GAU CAUGUGGU
2418	GGGAGUUC AGAA GGAUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAUCCA GAU GAACUCCC
2453	CAUCAUAA AGAA GUCGUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACGACU GCC UUAUGAUG
2492	CUAGGUUC AGAA GGUCUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGACCG GCU GAACCUAG
2547	CCAAAGGC AGAA GCUUCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAGCA GAU GCCUUUGG
2765	GGUAAGUG AGAA GGUUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAACCU GUC CACUUACC
2914	AAAUCCAG AGAA GGCUGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCAGCCA GCU CUGGAUUU
2993	GCUCCAAG AGAA GGAAGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUUCCU GAC CUUGGAGC

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3019	CACUUGGA	AGAA	GUAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUACA	GCU	UCCAAGUG
3165	CUGACAUA	AGAA	GGAUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAUCCA	GAU	UAUGUCAG
3378	GUAGUAUA	AGAA	GGGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCCCU	GAU	UAUACUAC
3404	CCAGCAUG	AGAA	GGUACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUACCA	GAC	CAUGCUGG
3418	CCCGUGCC	AGAA	GUCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGACU	GCU	GGCACGGG
3575	GUGAGGUA	AGAA	GAGAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUCUCU	GCC	UACCUCAC
3588	AUACAGGA	AGAA	GGUGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCACCU	GUU	UCCUGUAU
3689	CACUCACA	AGAA	GGCUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAGCCG	GCC	UGUGAGUG
3753	UGGUUGUC	AGAA	GGGAUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUCCCA	GAU	GACAACCA
3764	CACUGUCC	AGAA	GGUUGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACAACCA	GAC	GGACAGUG
3911	GAUAUCCG	AGAA	GGUAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUACCA	GUC	CGGAUAUC
3927	UCUGUGUC	AGAA	GAGUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCACUCC	GAU	GACACAGA
4011	AGAAUCUG	AGAA	GUGCUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAGCACA	GCC	CAGAUUCU
4016	GCUGGAGA	AGAA	GGGCUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGCCCA	GAU	UCUCCAGC
4025	CCGUGUCA	AGAA	GGAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUCCA	GCC	UGACACGG
4059	UCCUUUUA	AGAA	GGAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUCCU	GUU	UAAAAGGA
4111	AAAAUCUG	AGAA	GACCUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGGUCU	GCU	CAGAUUUU
4116	ACUUCAAA	AGAA	GAGCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCUCA	GAU	UUUGAAGU
4195	UCCCUGCA	AGAA	GAGGUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GACCUCG	GAC	UGCAGGGA

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4210 CCUAGAAG AGAA GGCUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA GGAGCCA GCU CUUCUAGG

Table VI: Mouse *flk*-1 VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Position	HH Ribozyme Sequence	Substrate
13	CCGUACCC CUGAUGA X GAA AUUCGCCC	GGGCGAAUU GGGUACGG
18	GGGUCCCG CUGAUGA X GAA ACCCAAUU	AAUUGGGUA CGGGACCC
31	UCGACCUC CUGAUGA X GAA AGGGGGGU	ACCCCCCUC GAGGUCGA
37	AUACCGUC CUGAUGA X GAA ACCUCGAG	CUCGAGGUC GACGGUAU
44	CUUAUCGA CUGAUGA X GAA ACCGUCGA	UCGACGGUA UCGAUAAG
46	AGCUUAUC CUGAUGA X GAA AUACCGUC	GACGGUAUC GAUAAGCU
50	AUCAAGCU CUGAUGA X GAA AUCGAUAC	GUAUCGAUA AGCUUGAU
55	UCGAUAUC CUGAUGA X GAA AGCUUAUC	GAUAAGCUU GAUAUCGA
59	GAAUUCGA CUGAUGA X GAA AUCAAGCU	AGCUUGAUA UCGAAUUC
61	CCGAAUUC CUGAUGA X GAA AUAUCAAG	CUUGAUAUC GAAUUCGG
66	UGGGCCCG CUGAUGA X GAA AUUCGAUA	UAUCGAAUU CGGGCCCA
67	CUGGGCCC CUGAUGA X GAA AAUUCGAU	AUCGAAUUC GGGCCCAG
83	GGCUGCGG CUGAUGA X GAA ACACAGUC	GACUGUGUC CCGCAGCC
97	AGCCAGGU CUGAUGA X GAA AUCCCGGC	GCCGGGAUA ACCUGGCU
114	GUCCGCGG CUGAUGA X GAA AUCGGGUC	GACCCGAUU CCGCGGAC
115	UGUCCGCG CUGAUGA X GAA AAUCGGGU	ACCCGAUUC CGCGGACA
169	ACCGGGGA CUGAUGA X GAA AGCGCGGG	CCCGCGCUC UCCCCGGU
171	AGACCGGG CUGAUGA X GAA AGAGCGCG	CGCGCUCUC CCCGGUCU
178	CAGCGCAA CUGAUGA X GAA ACCGGGGA	UCCCCGGUC UUGCGCUG
180	CGCAGCGC CUGAUGA X GAA AGACCGGG	CCCGGUCUU GCGCUGCG
197	AGAGGCGG CUGAUGA X GAA AUGGCCCC	GGGGCCAUA CCGCCUCU
204	AAGUCACA CUGAUGA X GAA AGGCGGUA	UACCGCCUC UGUGACUU
212	CCGCAAAG CUGAUGA X GAA AGUCACAG	CUGUGACUU CUUUGCGG
213	CCCGCAAA CUGAUGA X GAA AAGUCACA	UGUGACUUC UUUGCGGG
215	GGCCCGCA CUGAUGA X GAA AGAAGUCA	UGACUUCUU UGCGGGCC

216	UGGCCCGC CUGAUGA X GAA AAGAAGUC	GACUUCUUU GCGGGCCA
241	CAGGCACA CUGAUGA X GAA ACUCCUUC	GAAGGAGUC UGUGCCUG
262	UGGGCACA CUGAUGA X GAA AGCCCAGU	ACUGGGCUC UGUGCCCA
306	GCGACAGC CUGAUGA X GAA AGCAGCGC	GCGCUGCUA GCUGUCGC
312	CACAGAGC CUGAUGA X GAA ACAGCUAG	CUAGCUGUC GCUCUGUG
316	GAACCACA CUGAUGA X GAA AGCGACAG	CUGUCGCUC UGUGGUUC
323	CCACGCAG CUGAUGA X GAA ACCACAGA	UCUGUGGUU CUGCGUGG
324	UCCACGCA CUGAUGA X GAA AACCACAG	CUGUGGUUC UGCGUGGA
347	AACCCACA CUGAUGA X GAA AGGCGGCU	AGCCGCCUC UGUGGGUU
355	GCCAGUCA CUGAUGA X GAA ACCCACAG	CUGUGGGUU UGACUGGC
356	CGCCAGUC CUGAUGA X GAA AACCCACA	UGUGGGUUU GACUGGCG
367	AUGGAGAA CUGAUGA X GAA AUCGCCAG	CUGGCGAUU UUCUCCAU
368	GAUGGAGA CUGAUGA X GAA AAUCGCCA	UGGCGAUUU UCUCCAUC
369	GGAUGGAG CUGAUGA X GAA AAAUCGCC	GGCGAUUUU CUCCAUCC
370	GGGAUGGA CUGAUGA X GAA AAAAUCGC	GCGAUUUUC UCCAUCCC
372	GGGGGAUG CUGAUGA X GAA AGAAAAUC	GAUUUUCUC CAUCCCCC
376	CUUGGGGG CUGAUGA X GAA AUGGAGAA	UUCUCCAUC CCCCCAAG
387	UGUGUGCU CUGAUGA X GAA AGCUUGGG	CCCAAGCUC AGCACACA
405	AUUGUCAG CUGAUGA X GAA AUGUCUUU	AAAGACAUA CUGACAAU
414	UUUGCCAA CUGAUGA X GAA AUUGUCAG	CUGACAAUU UUGGCAAA
415	AUUUGCCA CUGAUGA X GAA AAUUGUCA	UGACAAUUU UGGCAAAU
416	UAUUUGCC CUGAUGA X GAA AAAUUGUC	GACAAUUUU GGCAAAUA
424	AAGGGUUG CUGAUGA X GAA AUUUGCCA	UGGCAAAUA CAACCCUU
432	GUAAUCUG CUGAUGA X GAA AGGGUUGU	ACAACCCUU CAGAUUAC
433	AGUAAUCU CUGAUGA X GAA AAGGGUUG	CAACCCUUC AGAUUACU
438	CUGCAAGU CUGAUGA X GAA AUCUGAAG	CUUCAGAUU ACUUGCAG
439	CCUGCAAG CUGAUGA X GAA AAUCUGAA	UUCAGAUUA CUUGCAGG
442	UCCCCUGC CUGAUGA X GAA AGUAAUCU	AGAUUACUU GCAGGGGA
471	UUGGGCCA CUGAUGA X GAA AGCCAGUC	GACUGGCUU UGGCCCAA
472	AUUGGGCC CUGAUGA X GAA AAGCCAGU	ACUGGCUUU GGCCCAAU

484	AUCACGCU	CUGAUGA	X	GAA	AGCAUUGG	CCAAUGCUC	AGCGUGAU
493	UUCCUCAG	CUGAUGA	X	GAA	AUCACGCU	AGCGUGAUU	CUGAGGAA
494	UUUCCUCA	CUGAUGA	X	GAA	AAUCACGC	GCGUGAUUC	UGAGGAAA
507	GUCACCAA	CUGAUGA	X	GAA	ACCCUUUC	GAAAGGGUA	UUGGUGAC
509	CAGUCACC	CUGAUGA	X	GAA	AUACCCUU	AAGGGUAUU	GGUGACUG
538	GCAGAAGA	CUGAUGA	X	GAA	ACUGUCAC	GUGACAGUA	UCUUCUGC
540	UUGCAGAA	CUGAUGA	X	GAA	AUACUGUC	GACAGUAUC	UUCUGCAA
542	UUUUGCAG	CUGAUGA	X	GAA	AGAUACUG	CAGUAUCUU	CUGCAAAA
543	GUUUUGCA	CUGAUGA	X	GAA	AAGAUACU	AGUAUCUUC	UGCAAAAC
555	GGAAUGGU	CUGAUGA	X	GAA	AGUGUUUU	AAAACACUC	ACCAUUCC
561	ACCCUGGG	CUGAUGA	X	GAA	AUGGUGAG	CUCACCAUU	CCCAGGGU
562	CACCCUGG	CUGAUGA	X	GAA	AAUGGUGA	UCACCAUUC	CCAGGGUG
573	UCAUUUCC	CUGAUGA	X	GAA	ACCACCCU	AGGGUGGUU	GGAAAUGA
583	GGCUCCAG	CUGAUGA	X	GAA	AUCAUUUC	GAAAUGAUA	CUGGAGCC
593	AGCACUUG	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	CAAGUGCU
602	CCCGGUAC	CUGAUGA	X	GAA	AGCACUUG	CAAGUGCUC	GUACCGGG
605	CGUCCCGG	CUGAUGA	X	GAA	ACGAGCAC	GUGCUCGUA	CCGGGACG
615	GCUAUGUC	CUGAUGA	X	GAA	ACGUCCCG	CGGGACGUC	GACAUAGC
621	GUGGAGGC	CUGAUGA	X	GAA	AUGUCGAC	GUCGACAUA	GCCUCCAC
626	AAACAGUG	CUGAUGA	X	GAA	AGGCUAUG	CAUAGCCUC	CACUGUUU
633	UAGACAUA	CUGAUGA	X	GAA	ACAGUGGA	UCCACUGUU	UAUGUCUA
634	AUAGACAU	CUGAUGA	X	GAA	AACAGUGG	CCACUGUUU	AUGUCUAU
635	CAUAGACA	CUGAUGA	X	GAA	AAACAGUG	CACUGUUUA	UGUCUAUG
639	CGAACAUA	CUGAUGA	X	GAA	ACAUAAAC	GUUUAUGUC	UAUGUUCG
641	CUCGAACA	CUGAUGA	X	GAA	AGACAUAA	UUAUGUCUA	UGUUCGAG
645	UAAUCUCG	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUU	CGAGAUUA
646	GUAAUCUC	CUGAUGA	X	GAA	AACAUAGA	UCUAUGUUC	GAGAUUAC
652	UGAUCUGU	CUGAUGA	X	GAA	AUCUCGAA	UUCGAGAUU	ACAGAUCA
653	GUGAUCUG	CUGAUGA	X	GAA	AAUCUCGA	UCGAGAUUA	CAGAUCAC
659	UGAAUGGU	CUGAUGA	X	GAA	AUCUGUAA	UUACAGAUC	ACCAUUCA

665	AGGCGAUG	CUGAUGA	X	GAA	AUGGUGAU	AUCACCAUU CAUCGCCU
666	GAGGCGAU	CUGAUGA	X	GAA	AAUGGUGA	UCACCAUUC AUCGCCUC
669	ACAGAGGC	CUGAUGA	X	GAA	AUGAAUGG	CCAUUCAUC GCCUCUGU
674	CACUGACA	CUGAUGA	X	GAA	AGGCGAUG	CAUCGCCUC UGUCAGUG
678	UGGUCACU	CUGAUGA	X	GAA	ACAGAGGC	GCCUCUGUC AGUGACCA
696	AUGUACAC	CUGAUGA	X	GAA	AUGCCAUG	CAUGGCAUC GUGUACAU
701	CGGUGAUG	CUGAUGA	X	GAA	ACACGAUG	CAUCGUGUA CAUCACCG
705	UUCUCGGU	CUGAUGA	X	GAA	AUGUACAC	GUGUACAUC ACCGAGAA
735	CGGCAGGG	CUGAUGA	X	GAA	AUCACCAC	GUGGUGAUC CCCUGCCG
749	UUGAAAUC	CUGAUGA	X	GAA	ACCCUCGG	CCGAGGGUC GAUUUCAA
753	AGGUUUGA	CUGAUGA	X	GAA	AUCGACCC	GGGUCGAUU UCAAACCU
754	GAGGUUUG	CUGAUGA	X	GAA	AAUCGACC	GGUCGAUUU CAAACCUC
755	UGAGGUUU	CUGAUGA	X	GAA	AAAUCGAC	GUCGAUUUC AAACCUCA
762	GACACAUU	CUGAUGA	X	GAA	AGGUUUGA	UCAAACCUC AAUGUGUC
770	CGCAAAGA	CUGAUGA	X	GAA	ACACAUUG	CAAUGUGUC UCUUUGCG
772	AGCGCAAA	CUGAUGA	X	GAA	AGACACAU	AUGUGUCUC UUUGCGCU
774	CUAGCGCA	CUGAUGA	X	GAA	AGAGACAC	GUGUCUCUU UGCGCUAG
775	CCUAGCGC	CUGAUGA	X	GAA	AAGAGACA	UGUCUCUUU GCGCUAGG
781	UGGAUACC	CUGAUGA	X	GAA	AGCGCAAA	UUUGCGCUA GGUAUCCA
785	UUUCUGGA	CUGAUGA	X	GAA	ACCUAGCG	CGCUAGGUA UCCAGAAA
787	CUUUUCUG	CUGAUGA	X	GAA	AUACCUAG	CUAGGUAUC CAGAAAAG
800	CCGGAACA	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUU UGUUCCGG
801	UCCGGAAC	CUGAUGA	X	GAA	AAUCUCUU	AAGAGAUUU GUUCCGGA
804	CCAUCCGG	CUGAUGA	X	GAA	ACAAAUCU	AGAUUUGUU CCGGAUGG
805	UCCAUCCG	CUGAUGA	X	GAA	AACAAAUC	GAUUUGUUC CGGAUGGA
822	UCCCAGGA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU UCCUGGGA
823	GUCCCAGG	CUGAUGA	X	GAA	AAUUCUGU	ACAGAAUUU CCUGGGAC
824	UGUCCCAG	CUGAUGA	X	GAA	AAAUUCUG	CAGAAUUUC CUGGGACA
840	GUAAAGCC	CUGAUGA	X	GAA	AUCUCGCU	AGCGAGAUA GGCUUUAC
845	GGAGAGUA	CUGAUGA	X	GAA	AGCCUAUC	GAUAGGCUU UACUCUCC

846	GGGAGAGU	CUGAUGA	X	GAA	AAGCCUAU	AUAGGCUUU	ACUCUCCC
847	GGGGAGAG	CUGAUGA	X	GAA	AAAGCCUA	UAGGCUUUA	CUCUCCCC
850	ACUGGGGA	CUGAUGA	X	GAA	AGUAAAGC	GCUUUACUC	UCCCCAGU
852	UAACUGGG	CUGAUGA	X	GAA	AGAGUAAA	UUUACUCUC	CCCAGUUA
859	GAUCAUGU	CUGAUGA	X	GAA	ACUGGGGA	UCCCCAGUU	ACAUGAUC
860	UGAUCAUG	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	CAUGAUCA
867	GCAUAGCU	CUGAUGA	X	GAA	AUCAUGUA	UACAUGAUC	AGCUAUGC
872	UGCCGGCA	CUGAUGA	X	GAA	AGCUGAUC	GAUCAGCUA	UGCCGGCA
885	UCACAGAA	CUGAUGA	X	GAA	ACCAUGCC	GGCAUGGUC	UUCUGUGA
887	CCUCACAG	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUU	CUGUGAGG
888	GCCUCACA	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUC	UGUGAGGC
903	UCAUCAUU	CUGAUGA	X	GAA	AUCUUUGC	GCAAAGAUC	AAUGAUGA
917	UAGACUGA	CUGAUGA	X	GAA	AGGUUUCA	UGAAACCUA	UCAGUCUA
919	GAUAGACU	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	AGUCUAUC
923	ACAUGAUA	CUGAUGA	X	GAA	ACUGAUAG	CUAUCAGUC	UAUCAUGU
925	GUACAUGA	CUGAUGA	X	GAA	AGACUGAU	AUCAGUCUA	UCAUGUAC
927	AUGUACAU	CUGAUGA	X	GAA	AUAGACUG	CAGUCUAUC	AUGUACAU
932	CAACUAUG	CUGAUGA	X	GAA	ACAUGAUA	UAUCAUGUA	CAUAGUUG
936	ACCACAAC	CUGAUGA	X	GAA	AUGUACAU	AUGUACAUA	GUUGUGGU
939	ACAACCAC	CUGAUGA	X	GAA	ACUAUGUA	UACAUAGUU	GUGGUUGU
945	UAUCCUAC	CUGAUGA	X	GAA	ACCACAAC	GUUGUGGUU	GUAGGAUA
948	CUAUAUCC	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUA	GGAUAUAG
953	AAAUCCUA	CUGAUGA	X	GAA	AUCCUACA	UGUAGGAUA	UAGGAUUU
955	AUAAAUCC	CUGAUGA	X	GAA	AUAUCCUA	UAGGAUAUA	GGAUUUAU
960	ACAUCAUA	CUGAUGA	X	GAA	AUCCUAUA	UAUAGGAUU	UAUGAUGU
961	CACAUCAU	CUGAUGA	X	GAA	AAUCCUAU	AUAGGAUUU	AUGAUGUG
962	UCACAUCA	CUGAUGA	X	GAA	AAAUCCUA	UAGGAUUUA	UGAUGUGA
972	GGGCUCAG	CUGAUGA	X	GAA	AUCACAUC	GAUGUGAUU	CUGAGCCC
973	GGGGCUCA	CUGAUGA	X	GAA	AAUCACAU	AUGUGAUUC	UGAGCCCC
993	GAUAGCUC	CUGAUGA	X	GAA	AUUUCAUG	CAUGAAAUU	GAGCUAUC

999	CCGGCAGA	CUGAUGA	X	GAA	AGCUCAAU	AUUGAGCUA	UCUGCCGG
1001	CUCCGGCA	CUGAUGA	X	GAA	AUAGCUCA	UGAGCUAUC	UGCCGGAG
1017	UUUAAGAC	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUU	GUCUUAAA
1020	CAAUUUAA	CUGAUGA	X	GAA	ACAAGUUU	AAACUUGUC	UUAAAUUG
1022	UACAAUUU	CUGAUGA	X	GAA	AGACAAGU	ACUUGUCUU	AAAUUGUA
1023	GUACAAUU	CUGAUGA	X	GAA	AAGACAAG	CUUGUCUUA	AAUUGUAC
1027	CGCUGUAC	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUU	GUACAGCG
1030	UCUCGCUG	CUGAUGA	X	GAA	ACAAUUUA	UAAAUUGUA	CAGCGAGA
1047	CCCACAUU	CUGAUGA	X	GAA	AGCUCUGU	ACAGAGCUC	AAUGUGGG
1059	GUGAAAUC	CUGAUGA	X	GAA	AGCCCCAC	GUGGGGCUU	GAUUUCAC
1063	CCAGGUGA	CUGAUGA	X	GAA	AUCAAGCC	GGCUUGAUU	UCACCUGG
1064	GCCAGGUG	CUGAUGA	X	GAA	AAUCAAGC	GCUUGAUUU	CACCUGGC
1065	UGCCAGGU	CUGAUGA	X	GAA	AAAUCAAG	CUUGAUUUC	ACCUGGCA
1076	AAGGUGGA	CUGAUGA	X	GAA	AGUGCCAG	CUGGCACUC	UCCACCUU
1078	UGAAGGUG	CUGAUGA	X	GAA	AGAGUGCC	GGCACUCUC	CACCUUCA
1084	AGACUUUG	CUGAUGA	X	GAA	AGGUGGAG	CUCCACCUU	CAAAGUCU
1085	GAGACUUU	CUGAUGA	X	GAA	AAGGUGGA	UCCACCUUC	AAAGUCUC
1091	UAUGAUGA	CUGAUGA	X	GAA	ACUUUGAA	UUCAAAGUC	UCAUCAUA
1093	CUUAUGAU	CUGAUGA	X	GAA	AGACUUUG	CAAAGUCUC	AUCAUAAG
1096	CUUCUUAU	CUGAUGA	X	GAA	AUGAGACU	AGUCUCAUC	AUAAGAAG
1099	AAUCUUCU	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUA	AGAAGAUU
1107	CGGUUUAC	CUGAUGA	X	GAA	AUCUUCUU	AAGAAGAUU	GUAAACCG
1110	UCCCGGUU	CUGAUGA	X	GAA	ACAAUCUU	AAGAUUGUA	AACCGGGA
1130	UCCCAGGA	CUGAUGA	X	GAA	AGGGUUUC	GAAACCCUU	UCCUGGGA
1131	GUCCCAGG	CUGAUGA	X	GAA	AAGGGUUU	AAACCCUUU	CCUGGGAC
1132	AGUCCCAG	CUGAUGA	X	GAA	AAAGGGUU	AACCCUUUC	CUGGGACU
1154	UGCUCAAA	CUGAUGA	X	GAA	ACAUCUUC	GAAGAUGUU	UUUGAGCA
1155	GUGCUCAA	CUGAUGA	X	GAA	AACAUCUU	AAGAUGUUU	UUGAGCAC
1156	GGUGCUCA	CUGAUGA	X	GAA	AAACAUCU	AGAUGUUUU	UGAGCACC
1157	AGGUGCUC	CUGAUGA	X	GAA	AAAACAUC	GAUGUUUUU	GAGCACCU

1166	CUAUUGUC	CUGAUGA	X	GAA	AGGUGCUC	GAGCACCUU	GACAAUAG
1173	ACACUUUC	CUGAUGA	X	GAA	AUUGUCAA	UUGACAAUA	GAAAGUGU
1205	CACAGGUG	CUGAUGA	X	GAA	AUUCCCCU	AGGGGAAUA	CACCUGUG
1215	CUGGACGC	CUGAUGA	X	GAA	ACACAGGU	ACCUGUGUA	GCGUCCAG
1220	GUCCACUG	CUGAUGA	X	GAA	ACGCUACA	UGUAGCGUC	CAGUGGAC
1236	UUUCUCUU	CUGAUGA	X	GAA	AUCAUCCG	CGGAUGAUC	AAGAGAAA
1246	AAAUGUUC	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUA	GAACAUUU
1253	CUCGGACA	CUGAUGA	X	GAA	AUGUUCUA	UAGAACAUU	UGUCCGAG
1254	ACUCGGAC	CUGAUGA	X	GAA	AAUGUUCU	AGAACAUUU	GUCCGAGU
1257	UGAACUCG	CUGAUGA	X	GAA	ACAAAUGU	ACAUUUGUC	CGAGUUCA
1263	UUUGUGUG	CUGAUGA	X	GAA	ACUCGGAC	GUCCGAGUU	CACACAAA
1264	CUUUGUGU	CUGAUGA	X	GAA	AACUCGGA	UCCGAGUUC	ACACAAAG
1276	AGCAAUAA	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUU	UUAUUGCU
1277	AAGCAAUA	CUGAUGA	X	GAA	AAGGCUUU	AAAGCCUUU	UAUUGCUU
1278	AAAGCAAU	CUGAUGA	X	GAA	AAAGGCUU	AAGCCUUUU	AUUGCUUU
1279	GAAAGCAA	CUGAUGA	X	GAA	AAAAGGCU	AGCCUUUUA	UUGCUUUC
1281	CCGAAAGC	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUAUU	GCUUUCGG
1285	ACUACCGA	CUGAUGA	X	GAA	AGCAAUAA	UUAUUGCUU	UCGGUAGU
1286	CACUACCG	CUGAUGA	X	GAA	AAGCAAUA	UAUUGCUUU	CGGUAGUG
1287	CCACUACC	CUGAUGA	X	GAA	AAAGCAAU	AUUGCUUUC	GGUAGUGG
1291	CAUCCCAC	CUGAUGA	X	GAA	ACCGAAAG	CUUUCGGUA	GUGGGAUG
1304	CCACCAAA	CUGAUGA	X	GAA	AUUUCAUC	GAUGAAAUC	UUUGGUGG
1306	UUCCACCA	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUU	UGGUGGAA
1307	CUUCCACC	CUGAUGA	X	GAA	AAGAUUUC	GAAAUCUUU	GGUGGAAG
1330	UCGGACUU	CUGAUGA	X	GAA	ACUGCCCA	UGGGCAGUC	AAGUCCGA
1335	GGGAUUCG	CUGAUGA	X	GAA	ACUUGACU	AGUCAAGUC	CGAAUCCC
1341	UUCACAGG	CUGAUGA	X	GAA	AUUCGGAC	GUCCGAAUC	CCUGUGAA
1352	AACUGAGA	CUGAUGA	X	GAA	ACUUCACA	UGUGAAGUA	UCUCAGUU
1354	GUAACUGA	CUGAUGA	X	GAA	AUACUUCA	UGAAGUAUC	UCAGUUAC
1356	GGGUAACU	CUGAUGA	X	GAA	AGAUACUU	AAGUAUCUC	AGUUACCC

1360	AGCUGGGU	CUGAUGA	X	GAA	ACUGAGAU	AUCUCAGUU	ACCCAGCU
1361	GAGCUGGG	CUGAUGA	X	GAA	AACUGAGA	UCUCAGUUA	CCCAGCUC
1369	GAUAUCAG	CUGAUGA	X	GAA	AGCUGGGU	ACCCAGCUC	CUGAUAUC
1375	CCAUUUGA	CUGAUGA	X	GAA	AUCAGGAG	CUCCUGAUA	UCAAAUGG
1377	UACCAUUU	CUGAUGA	X	GAA	AUAUCAGG	CCUGAUAUC	AAAUGGUA
1385	CAUUUCUG	CUGAUGA	X	GAA	ACCAUUUG	CAAAUGGUA	CAGAAAUG
1404	UUGGACUC	CUGAUGA	X	GAA	AUGGGCCU	AGGCCCAUU	GAGUCCAA
1409	UGUAGUUG	CUGAUGA	X	GAA	ACUCAAUG	CAUUGAGUC	CAACUACA
1415	UCAUUGUG	CUGAUGA	X	GAA	AGUUGGAC	GUCCAACUA	CACAAUGA
1425	UCGCCAAC	CUGAUGA	X	GAA	AUCAUUGU	ACAAUGAUU	GUUGGCGA
1428	UCAUCGCC	CUGAUGA	X	GAA	ACAAUCAU	AUGAUUGUU	GGCGAUGA
1440	AUGAUGGU	CUGAUGA	X	GAA	AGUUCAUC	GAUGAACUC	ACCAUCAU
1446	ACUUCCAU	CUGAUGA	X	GAA	AUGGUGAG	CUCACCAUC	AUGGAAGU
1478	UGACCGUG	CUGAUGA	X	GAA	AGUUUCCU	AGGAAACUA	CACGGUCA
1485	GUGAGGAU	CUGAUGA	X	GAA	ACCGUGUA	UACACGGUC	AUCCUCAC
1488	UUGGUGAG	CUGAUGA	X	GAA	AUGACCGU	ACGGUCAUC	CUCACCAA
1491	GGGUUGGU	CUGAUGA	X	GAA	AGGAUGAC	GUCAUCCUC	ACCAACCC
1503	UCCAUUGA	CUGAUGA	X	GAA	AUGGGGUU	AACCCCAUU	UCAAUGGA
1504	CUCCAUUG	CUGAUGA	X	GAA	AAUGGGGU	ACCCCAUUU	CAAUGGAG
1505	UCUCCAUU	CUGAUGA	X	GAA	AAAUGGGG	CCCCAUUUC	AAUGGAGA
1530	ACCAGAGA	CUGAUGA	X	GAA	ACCAUGUG	CACAUGGUC	UCUCUGGU
1532	CAACCAGA	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUC	UCUGGUUG
1534	CACAACCA	CUGAUGA	X	GAA	AGAGACCA	UGGUCUCUC	UGGUUGUG
1539	ACAUUCAC	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	GUGAAUGU
1548	UGGGGUGG	CUGAUGA	X	GAA	ACAUUCAC	GUGAAUGUC	CCACCCCA
1560	UUCUCACC	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUC	GGUGAGAA
1574	GCGAGAUC	CUGAUGA	X	GAA	AGGCUUUC	GAAAGCCUU	GAUCUCGC
1578	AUAGGCGA	CUGAUGA	X	GAA	AUCAAGGC	GCCUUGAUC	UCGCCUAU
1580	CCAUAGGC	CUGAUGA	X	GAA	AGAUCAAG	CUUGAUCUC	GCCUAUGG
1585	GGAAUCCA	CUGAUGA	X	GAA	AGGCGAGA	UCUCGCCUA	UGGAUUCC

1591	CUGGUAGG	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUU	CCUACCAG
1592	ACUGGUAG	CUGAUGA	X	GAA	AAUCCAUA	UAUGGAUUC	CUACCAGU
1595	CAUACUGG	CUGAUGA	X	GAA	AGGAAUCC	GGAUUCCUA	CCAGUAUG
1601	UGGUCCCA	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUA	UGGGACCA
1619	UGCAUGUC	CUGAUGA	X	GAA	AUGUCUGC	GCAGACAUU	GACAUGCA
1632	UUGGCGUA	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUC	UACGCCAA
1634	GGUUGGCG	CUGAUGA	X	GAA	AGACUGUG	CACAGUCUA	CGCCAACC
1645	GUGCAGGG	CUGAUGA	X	GAA	AGGGUUGG	CCAACCCUC	CCCUGCAC
1659	UACCACUG	CUGAUGA	X	GAA	AUGUGGUG	CACCACAUC	CAGUGGUA
1667	GCUGCCAG	CUGAUGA	X	GAA	ACCACUGG	CCAGUGGUA	CUGGCAGC
1677	GCUUCUUC	CUGAUGA	X	GAA	AGCUGCCA	UGGCAGCUA	GAAGAAGC
1691	GUCUGUAG	CUGAUGA	X	GAA	AGCAGGCU	AGCCUGCUC	CUACAGAC
1694	CGGGUCUG	CUGAUGA	X	GAA	AGGAGCAG	CUGCUCCUA	CAGACCCG
1718	UACAAGCA	CUGAUGA	X	GAA	ACGGGCUU	AAGCCCGUA	UGCUUGUA
1723	UUCUUUAC	CUGAUGA	X	GAA	AGCAUACG	CGUAUGCUU	GUAAAGAA
1726	CCAUUCUU	CUGAUGA	X	GAA	ACAAGCAU	AUGCUUGUA	AAGAAUGG
1750	CCCCUGGA	CUGAUGA	X	GAA	AUCCUCCA	UGGAGGAUU	UCCAGGGG
1751	CCCCCUGG	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAUUU	CCAGGGGG
1752	CCCCCCUG	CUGAUGA	X	GAA	AAAUCCUC	GAGGAUUUC	CAGGGGGG
1770	GUGACUUC	CUGAUGA	X	GAA	AUCUUGUU	AACAAGAUC	GAAGUCAC
1776	UUUUUGGU	CUGAUGA	X	GAA	ACUUCGAU	AUCGAAGUC	ACCAAAAA
1790	UCAGGGCA	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUA	UGCCCUGA
1800	UUUCCUUC	CUGAUGA	X	GAA	AUCAGGGC	GCCCUGAUU	GAAGGAAA
1821	AGCGUACU	CUGAUGA	X	GAA	ACAGUUUU	AAAACUGUA	AGUACGCU
1825	GACCAGCG	CUGAUGA	X	GAA	ACUUACAG	CUGUAAGUA	CGCUGGUC
1833	GCUUGGAU	CUGAUGA	X	GAA	ACCAGCGU	ACGCUGGUC	AUCCAAGC
1836	GCAGCUUG	CUGAUGA	X	GAA	AUGACCAG	CUGGUCAUC	CAAGCUGC
1853	ACAACGCU	CUGAUGA	X	GAA	ACACGUUG	CAACGUGUC	AGCGUUGU
1859	AUUUGUAC	CUGAUGA	X	GAA	ACGCUGAC	GUCAGCGUU	GUACAAAU
1862	CACAUUUG	CUGAUGA	X	GAA	ACAACGCU	AGCGUUGUA	CAAAUGUG

1878	GCUUUGUU	CUGAUGA	X	GAA	AUGGCUUC	GAAGCCAUC	AACAAAGC
1905	AAGGAGAU	CUGAUGA	X	GAA	ACCCUCUC	GAGAGGGUC	AUCUCCUU
1908	UGGAAGGA	CUGAUGA	X	GAA	AUGACCCU	AGGGUCAUC	UCCUUCCA
1910	CAUGGAAG	CUGAUGA	X	GAA	AGAUGACC	GGUCAUCUC	CUUCCAUG
1913	UCACAUGG	CUGAUGA	X	GAA	AGGAGAUG	CAUCUCCUU	CCAUGUGA
1914	AUCACAUG	CUGAUGA	X	GAA	AAGGAGAU	AUCUCCUUC	CAUGUGAU
1923	GGACCCCU	CUGAUGA	X	GAA	AUCACAUG	CAUGUGAUC	AGGGGUCC
1930	AAUUUCAG	CUGAUGA	X	GAA	ACCCCUGA	UCAGGGGUC	CUGAAAUU
1938	UGCACAGU	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUU	ACUGUGCA
1939	UUGCACAG	CUGAUGA	X	GAA	AAUUUCAG	CUGAAAUUA	CUGUGCAA
1982	ACAACAGG	CUGAUGA	X	GAA	ACACACUC	GAGUGUGUC	CCUGUUGU
1988	CAGUGCAC	CUGAUGA	X	GAA	ACAGGGAC	GUCCCUGUU	GUGCACUG
2008	CUCAAACG	CUGAUGA	X	GAA	AUUUCUGU	ACAGAAAUA	CGUUUGAG
2012	GGUUCUCA	CUGAUGA	X	GAA	ACGUAUUU	AAAUACGUU	UGAGAACC
2013	AGGUUCUC	CUGAUGA	X	GAA	AACGUAUU	AAUACGUUU	GAGAACCU
2022	UACCACGU	CUGAUGA	X	GAA	AGGUUCUC	GAGAACCUC	ACGUGGUA
2030	CAAGCUUG	CUGAUGA	X	GAA	ACCACGUG	CACGUGGUA	CAAGCUUG
2037	UGUGAGCC	CUGAUGA	X	GAA	AGCUUGUA	UACAAGCUU	GGCUCACA
2042	UUGCCUGU	CUGAUGA	X	GAA	AGCCAAGC	GCUUGGCUC	ACAGGCAA
2054	UGUGGACC	CUGAUGA	X	GAA	AUGUUGCC	GGCAACAUC	GGUCCACA
2058	CCCAUGUG	CUGAUGA	X	GAA	ACCGAUGU	ACAUCGGUC	CACAUGGG
2072	GUGUGAGU	CUGAUGA	X	GAA	AUUCGCCC	GGGCGAAUC	ACUCACAC
2076	ACUGGUGU	CUGAUGA	X	GAA	AGUGAUUC	GAAUCACUC	ACACCAGU
2085	UUCUUGCA	CUGAUGA	X	GAA	ACUGGUGU	ACACCAGUU	UGCAAGAA
2086	GUUCUUGC	CUGAUGA	X	GAA	AACUGGUG	CACCAGUUU	GCAAGAAC
2096	GAGCAUCC	CUGAUGA	X	GAA	AGUUCUUG	CAAGAACUU	GGAUGCUC
2104	UUUCCAAA	CUGAUGA	X	GAA	AGCAUCCA	UGGAUGCUC	UUUGGAAA
2106	AGUUUCCA	CUGAUGA	X	GAA	AGAGCAUC	GAUGCUCUU	UGGAAACU
2107	CAGUUUCC	CUGAUGA	X	GAA	AAGAGCAU	AUGCUCUUU	GGAAACUG
2129	UGUUAGAA	CUGAUGA	X	GAA	ACAUGGUG	CACCAUGUU	UUCUAACA

2130	CUGUUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUU	UCUAACAG
2131	GCUGUUAG	CUGAUGA	X	GAA	AAACAUGG	CCAUGUUUU	CUAACAGC
2132	UGCUGUUA	CUGAUGA	X	GAA	AAAACAUG	CAUGUUUUC	UAACAGCA
2134	UGUGCUGU	CUGAUGA	X	GAA	AGAAAACA	UGUUUUCUA	ACAGCACA
2151	ACAAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUC	UUGAUUGU
2153	CCACAAUC	CUGAUGA	X	GAA	AGAUGUCA	UGACAUCUU	GAUUGUGG
2157	AAUGCCAC	CUGAUGA	X	GAA	AUCAAGAU	AUCUUGAUU	GUGGCAUU
2165	CAUUCUGA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUU	UCAGAAUG
2166	GCAUUCUG	CUGAUGA	X	GAA	AAUGCCAC	GUGGCAUUU	CAGAAUGC
2167	GGCAUUCU	CUGAUGA	X	GAA	AAAUGCCA	UGGCAUUUC	AGAAUGCC
2177	CCUGCAGA	CUGAUGA	X	GAA	AGGCAUUC	GAAUGCCUC	UCUGCAGG
2179	GUCCUGCA	CUGAUGA	X	GAA	AGAGGCAU	AUGCCUCUC	UGCAGGAC
2198	AGCAAACA	CUGAUGA	X	GAA	AGUCGCCU	AGGCGACUA	UGUUUGCU
2202	GCAGAGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUU	UGCUCUGC
2203	AGCAGAGC	CUGAUGA	X	GAA	AACAUAGU	ACUAUGUUU	GCUCUGCU
2207	CUUGAGCA	CUGAUGA	X	GAA	AGCAAACA	UGUUUGCUC	UGCUCAAG
2212	CUUAUCUU	CUGAUGA	X	GAA	AGCAGAGC	GCUCUGCUC	AAGAUAAG
2218	GGUCUUCU	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUA	AGAAGACC
2239	GACCAGGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCCUGGUC
2247	AGCUGUUU	CUGAUGA	X	GAA	ACCAGGCA	UGCCUGGUC	AAACAGCU
2256	AGGAUGAU	CUGAUGA	X	GAA	AGCUGUUU	AAACAGCUC	AUCAUCCU
2259	UCUAGGAU	CUGAUGA	X	GAA	AUGAGCUG	CAGCUCAUC	AUCCUAGA
2262	CGCUCUAG	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUC	CUAGAGCG
2265	AUGCGCUC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GAGCGCAU
2286	UUUCCGGU	CUGAUGA	X	GAA	AUCAUGGG	CCCAUGAUC	ACCGGAAA
2296	AUUCUCCA	CUGAUGA	X	GAA	AUUUCCGG	CCGGAAAUC	UGGAGAAU
2305	UGUUGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACAACA
2319	GUCUCGCC	CUGAUGA	X	GAA	AUGGUUGU	ACAACCAUU	GGCGAGAC
2331	GUCACUUC	CUGAUGA	X	GAA	AUGGUCUC	GAGACCAUU	GAAGUGAC
2341	UGCUGGGC	CUGAUGA	X	GAA	AGUCACUU	AAGUGACUU	GCCCAGCA

2351	GAUUUCCA	CUGAUGA	X	GAA	AUGCUGGG	CCCAGCAUC	UGGAAAUC
2359	UGGGGUAG	CUGAUGA	X	GAA	AUUUCCAG	CUGGAAAUC	CUACCCCA
2362	GUGUGGGG	CUGAUGA	X	GAA	AGGAUUUC	GAAAUCCUA	CCCCACAC
2373	AACCAUGU	CUGAUGA	X	GAA	AUGUGUGG	CCACACAUU	ACAUGGUU
2374	GAACCAUG	CUGAUGA	X	GAA	AAUGUGUG	CACACAUUA	CAUGGUUC
2381	UGUCUUUG	CUGAUGA	X	GAA	ACCAUGUA	UACAUGGUU	CAAAGACA
2382	UUGUCUUU	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUC	AAAGACAA
2403	GAAUCUUC	CUGAUGA	X	GAA	ACCAGGGU	ACCCUGGUA	GAAGAUUC
2410	AAUGCCUG	CUGAUGA	X	GAA	AUCUUCUA	UAGAAGAUU	CAGGCAUU
2411	CAAUGCCU	CUGAUGA	X	GAA	AAUCUUCU	AGAAGAUUC	AGGCAUUG
2418	CUCAGUAC	CUGAUGA	X	GAA	AUGCCUGA	UCAGGCAUU	GUACUGAG
2421	UCUCUCAG	CUGAUGA	X	GAA	ACAAUGCC	GGCAUUGUA	CUGAGAGA
2449	CCUGCGGA	CUGAUGA	X	GAA	AGUCAGGU	ACCUGACUA	UCCGCAGG
2451	ACCCUGCG	CUGAUGA	X	GAA	AUAGUCAG	CUGACUAUC	CGCAGGGU
2481	CAGGUGUA	CUGAUGA	X	GAA	AGGCCUCC	GGAGGCCUC	UACACCUG
2483	GGCAGGUG	CUGAUGA	X	GAA	AGAGGCCU	AGGCCUCUA	CACCUGCC
2505	CAGCCAAG	CUGAUGA	X	GAA	ACAUUGCA	UGCAAUGUC	CUUGGCUG
2508	GCACAGCC	CUGAUGA	X	GAA	AGGACAUU	AAUGUCCUU	GGCUGUGC
2532	AUUAUGAA	CUGAUGA	X	GAA	AGCGUCUC	GAGACGCUC	UUCAUAAU
2534	CUAUUAUG	CUGAUGA	X	GAA	AGAGCGUC	GACGCUCUU	CAUAAUAG
2535	UCUAUUAU	CUGAUGA	X	GAA	AAGAGCGU	ACGCUCUUC	AUAAUAGA
2538	CCUUCUAU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUA	AUAGAAGG
2541	GCACCUUC	CUGAUGA	X	GAA	AUUAUGAA	UUCAUAAUA	GAAGGUGC
2567	UGACUUCC	CUGAUGA	X	GAA	AGUUGGUC	GACCAACUU	GGAAGUCA
2574	AGGAUAAU	CUGAUGA	X	GAA	ACUUCCAA	UUGGAAGUC	AUUAUCCU
2577	ACGAGGAU	CUGAUGA	X	GAA	AUGACUUC	GAAGUCAUU	AUCCUCGU
2578	GACGAGGA	CUGAUGA	X	GAA	AAUGACUU	AAGUCAUUA	UCCUCGUC
2580	CCGACGAG	CUGAUGA	X	GAA	AUAAUGAC	GUCAUUAUC	CUCGUCGG
2583	GUGCCGAC	CUGAUGA	X	GAA	AGGAUAAU	AUUAUCCUC	GUCGGCAC
2586	GCAGUGCC	CUGAUGA	X	GAA	ACGAGGAU	AUCCUCGUC	GGCACUGC

2601	AACAUGGC	CUGAUGA	X	GAA	AUCACUGC	GCAGUGAUU	GCCAUGUU
2609	GCCAGAAG	CUGAUGA	X	GAA	ACAUGGCA	UGCCAUGUU	CUUCUGGC
2610	AGCCAGAA	CUGAUGA	X	GAA	AACAUGGC	GCCAUGUUC	UUCUGGCU
2612	GGAGCCAG	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUU	CUGGCUCC
2613	AGGAGCCA	CUGAUGA	X	GAA	AAGAACAU	AUGUUCUUC	UGGCUCCU
2619	ACAAGAAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUC	CUUCUUGU
2622	AUGACAAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUU	CUUGUCAU
2623	AAUGACAA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCCUUC	UUGUCAUU
2625	ACAAUGAC	CUGAUGA	X	GAA	AGAAGGAG	CUCCUUCUU	GUCAUUGU
2628	AGGACAAU	CUGAUGA	X	GAA	ACAAGAAG	CUUCUUGUC	AUUGUCCU
2631	CGUAGGAC	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUU	GUCCUACG
2634	GUCCGUAG	CUGAUGA	X	GAA	ACAAUGAC	GUCAUUGUC	CUACGGAC
2637	ACGGUCCG	CUGAUGA	X	GAA	AGGACAAU	AUUGUCCUA	CGGACCGU
2646	GCCCGCUU	CUGAUGA	X	GAA	ACGGUCCG	CGGACCGUU	AAGCGGGC
2647	GGCCCGCU	CUGAUGA	X	GAA	AACGGUCC	GGACCGUUA	AGCGGGCC
2681	UAGACAAG	CUGAUGA	X	GAA	AGCCUGUC	GACAGGCUA	CUUGUCUA
2684	CAAUAGAC	CUGAUGA	X	GAA	AGUAGCCU	AGGCUACUU	GUCUAUUG
2687	UGACAAUA	CUGAUGA	X	GAA	ACAAGUAG	CUACUUGUC	UAUUGUCA
2689	CAUGACAA	CUGAUGA	X	GAA	AGACAAGU	ACUUGUCUA	UUGUCAUG
2691	UCCAUGAC	CUGAUGA	X	GAA	AUAGACAA	UUGUCUAUU	GUCAUGGA
2694	GGAUCCAU	CUGAUGA	X	GAA	ACAAUAGA	UCUAUUGUC	AUGGAUCC
2701	UUCAUCUG	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUC	CAGAUGAA
2711	CCAAGGGC	CUGAUGA	X	GAA	AUUCAUCU	AGAUGAAUU	GCCCUUGG
2717	GCUCAUCC	CUGAUGA	X	GAA	AGGGCAAU	AUUGCCCUU	GGAUGAGC
2738	CAUAAGGC	CUGAUGA	X	GAA	AGCGUUCA	UGAACGCUU	GCCUUAUG
2743	GGCAUCAU	CUGAUGA	X	GAA	AGGCAAGC	GCUUGCCUU	AUGAUGCC
2744	UGGCAUCA	CUGAUGA	X	GAA	AAGGCAAG	CUUGCCUUA	UGAUGCCA
2765	CCCUGGGG	CUGAUGA	X	GAA	AUUCCCAC	GUGGGAAUU	CCCCAGGG
2766	UCCCUGGG	CUGAUGA	X	GAA	AAUUCCCA	UGGGAAUUC	CCCAGGGA
2787	GGUUUUCC	CUGAUGA	X	GAA	AGUUUCAG	CUGAAACUA	GGAAAACC

2797	GCGGCCAA	CUGAUGA	X	GAA	AGGUUUUC	GAAAACCUC	UUGGCCGC
2799	CCGCGGCC	CUGAUGA	X	GAA	AGAGGUUU	AAACCUCUU	GGCCGCGG
2813	CUUGGCCG	CUGAUGA	X	GAA	AGGCACCG	CGGUGCCUU	CGGCCAAG
2814	ACUUGGCC	CUGAUGA	X	GAA	AAGGCACC	GGUGCCUUC	GGCCAAGU
2826	UCUGCCUC	CUGAUGA	X	GAA	AUCACUUG	CAAGUGAUU	GAGGCAGA
2839	AAUUCCAA	CUGAUGA	X	GAA	AGCGUCUG	CAGACGCUU	UUGGAAUU
2840	CAAUUCCA	CUGAUGA	X	GAA	AAGCGUCU	AGACGCUUU	UGGAAUUG
2841	UCAAUUCC	CUGAUGA	X	GAA	AAAGCGUC	GACGCUUUU	GGAAUUGA
2847	GUCUUGUC	CUGAUGA	X	GAA	AUUCCAAA	UUUGGAAUU	GACAAGAC
2863	UGUUUUGC	CUGAUGA	X	GAA	AGUCGCUG	CAGCGACUU	GCAAAACA
2874	UUGACGGC	CUGAUGA	X	GAA	ACUGUUUU	AAAACAGUA	GCCGUCAA
2880	AACAUCUU	CUGAUGA	X	GAA	ACGGCUAC	GUAGCCGUC	AAGAUGUU
2888	CUUCUUUC	CUGAUGA	X	GAA	ACAUCUUG	CAAGAUGUU	GAAAGAAG
2917	GAGGGCUC	CUGAUGA	X	GAA	AUGCUCGC	GCGAGCAUC	GAGCCCUC
2925	UCAGACAU	CUGAUGA	X	GAA	AGGGCUCG	CGAGCCCUC	AUGUCUGA
2930	UGAGUUCA	CUGAUGA	X	GAA	ACAUGAGG	CCUCAUGUC	UGAACUCA
2937	AGGAUCUU	CUGAUGA	X	GAA	AGUUCAGA	UCUGAACUC	AAGAUCCU
2943	UGGAUGAG	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUC	CUCAUCCA
2946	AUGUGGAU	CUGAUGA	X	GAA	AGGAUCUU	AAGAUCCUC	AUCCACAU
2949	CCAAUGUG	CUGAUGA	X	GAA	AUGAGGAU	AUCCUCAUC	CACAUUGG
2955	UGGUGACC	CUGAUGA	X	GAA	AUGUGGAU	AUCCACAUU	GGUCACCA
2959	GAGAUGGU	CUGAUGA	X	GAA	ACCAAUGU	ACAUUGGUC	ACCAUCUC
2965	CACAUUGA	CUGAUGA	X	GAA	AUGGUGAC	GUCACCAUC	UCAAUGUG
2967	ACCACAUU	CUGAUGA	X	GAA	AGAUGGUG	CACCAUCUC	AAUGUGGU
2982	GCGCCUAG	CUGAUGA	X	GAA	AGGUUCAC	GUGAACCUC	CUAGGCGC
2985	CAGGCGCC	CUGAUGA	X	GAA	AGGAGGUU	AACCUCCUA	GGCGCCUG
3013	CACCAUGA	CUGAUGA	X	GAA	AGGCCCUC	GAGGGCCUC	UCAUGGUG
3015	AUCACCAU	CUGAUGA	X	GAA	AGAGGCCC	GGGCCUCUC	AUGGUGAU
3024	AAUUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUGGAAUU
3032	ACUUGCAG	CUGAUGA	X	GAA	AUUCCACA	UGUGGAAUU	CUGCAAGU

3033	AACUUGCA	CUGAUGA	X	GAA	AAUUCCAC	GUGGAAUUC	UGCAAGUU
3041	GGUUUCCA	CUGAUGA	X	GAA	ACUUGCAG	CUGCAAGUU	UGGAAACC
3042	AGGUUUCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUU	GGAAACCU
3051	UAAGUUGA	CUGAUGA	X	GAA	AGGUUUCC	GGAAACCUA	UCAACUUA
3053	AGUAAGUU	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	AACUUACU
3058	CCGUAAGU	CUGAUGA	X	GAA	AGUUGAUA	UAUCAACUU	ACUUACGG
3059	CCCGUAAG	CUGAUGA	X	GAA	AAGUUGAU	AUCAACUUA	CUUACGGG
3062	UGCCCCGU	CUGAUGA	X	GAA	AGUAAGUU	AACUUACUU	ACGGGGCA
3063	UUGCCCCG	CUGAUGA	X	GAA	AAGUAAGU	ACUUACUUA	CGGGGCAA
3083	AGGGAACA	CUGAUGA	X	GAA	AUUCAUUU	AAAUGAAUU	UGUUCCCU
3084	UAGGGAAC	CUGAUGA	X	GAA	AAUUCAUU	AAUGAAUUU	GUUCCCUA
3087	UUAUAGGG	CUGAUGA	X	GAA	ACAAAUUC	GAAUUUGUU	CCCUAUAA
3088	CUUAUAGG	CUGAUGA	X	GAA	AACAAAUU	AAUUUGUUC	CCUAUAAG
3092	UGCUCUUA	CUGAUGA	X	GAA	AGGGAACA	UGUUCCCUA	UAAGAGCA
3094	UUUGCUCU	CUGAUGA	X	GAA	AUAGGGAA	UUCCCUAUA	AGAGCAAA
3113	CCUGGCGG	CUGAUGA	X	GAA	AGCGUGCC	GGCACGCUU	CCGCCAGG
3114	CCCUGGCG	CUGAUGA	X	GAA	AAGCGUGC	GCACGCUUC	CGCCAGGG
3131	CCCCAACG	CUGAUGA	X	GAA	AGUCCUUG	CAAGGACUA	CGUUGGGG
3135	AGCUCCCC	CUGAUGA	X	GAA	ACGUAGUC	GACUACGUU	GGGGAGCU
3144	UCCACGGA	CUGAUGA	X	GAA	AGCUCCCC	GGGGAGCUC	UCCGUGGA
3146	GAUCCACG	CUGAUGA	X	GAA	AGAGCUCC	GGAGCUCUC	CGUGGAUC
3154	UCUUUUCA	CUGAUGA	X	GAA	AUCCACGG	CCGUGGAUC	UGAAAAGA
3167	UGCUGUCC	CUGAUGA	X	GAA	AGCGUCUU	AAGACGCUU	GGACAGCA
3177	CUGCUGGU	CUGAUGA	X	GAA	AUGCUGUC	GACAGCAUC	ACCAGCAG
3194	AGCUGGCA	CUGAUGA	X	GAA	AGCUCUGG	CCAGAGCUC	UGCCAGCU
3203	CAAAGCCU	CUGAUGA	X	GAA	AGCUGGCA	UGCCAGCUC	AGGCUUUG
3209	CCUCAACA	CUGAUGA	X	GAA	AGCCUGAG	CUCAGGCUU	UGUUGAGG
3210	UCCUCAAC	CUGAUGA	X	GAA	AAGCCUGA	UCAGGCUUU	GUUGAGGA
3213	UUCUCCUC	CUGAUGA	X	GAA	ACAAAGCC	GGCUUUGUU	GAGGAGAA
3224	CACUGAGC	CUGAUGA	X	GAA	AUUUCUCC	GGAGAAAUC	GCUCAGUG

3228	ACAUCACU	CUGAUGA	X	GAA	AGCGAUUU	AAAUCGCUC	AGUGAUGU
3237	UCUUCCUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUA	GAGGAAGA
3253	UUCUUCAG	CUGAUGA	X	GAA	AGCUUCUU	AAGAAGCUU	CUGAAGAA
3254	GUUCUUCA	CUGAUGA	X	GAA	AAGCUUCU	AGAAGCUUC	UGAAGAAC
3266	AGUCCUUG	CUGAUGA	X	GAA	ACAGUUCU	AGAACUGUA	CAAGGACU
3275	AGGUCAGG	CUGAUGA	X	GAA	AGUCCUUG	CAAGGACUU	CCUGACCU
3276	AAGGUCAG	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUC	CUGACCUU
3284	GAUGCUCC	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	GGAGCAUC
3292	ACAGAUGA	CUGAUGA	X	GAA	AUGCUCCA	UGGAGCAUC	UCAUCUGU
3294	UAACAGAU	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUC	AUCUGUUA
3297	CUGUAACA	CUGAUGA	X	GAA	AUGAGAUG	CAUCUCAUC	UGUUACAG
3301	GAAGCUGU	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	ACAGCUUC
3302	GGAAGCUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUA	CAGCUUCC
3308	CCACUUGG	CUGAUGA	X	GAA	AGCUGUAA	UUACAGCUU	CCAAGUGG
3309	GCCACUUG	CUGAUGA	X	GAA	AAGCUGUA	UACAGCUUC	CAAGUGGC
3319	CAUGCCCU	CUGAUGA	X	GAA	AGCCACUU	AAGUGGCUA	AGGGCAUG
3332	AUGCCAAG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CUUGGCAU
3333	GAUGCCAA	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	UUGGCAUC
3335	UUGAUGCC	CUGAUGA	X	GAA	AGAACUCC	GGAGUUCUU	GGCAUCAA
3341	ACUUCCUU	CUGAUGA	X	GAA	AUGCCAAG	CUUGGCAUC	AAGGAAGU
3352	CCUGUGGA	CUGAUGA	X	GAA	ACACUUCC	GGAAGUGUA	UCCACAGG
3354	UCCCUGUG	CUGAUGA	X	GAA	AUACACUU	AAGUGUAUC	CACAGGGA
3381	GAUAGGAG	CUGAUGA	X	GAA	AUGUUUCG	CGAAACAUU	CUCCUAUC
3382	CGAUAGGA	CUGAUGA	X	GAA	AAUGUUUC	GAAACAUUC	UCCUAUCG
3384	UCCGAUAG	CUGAUGA	X	GAA	AGAAUGUU	AACAUUCUC	CUAUCGGA
3387	UUCUCCGA	CUGAUGA	X	GAA	AGGAGAAU	AUUCUCCUA	UCGGAGAA
3389	UCUUCUCC	CUGAUGA	X	GAA	AUAGGAGA	UCUCCUAUC	GGAGAAGA
3405	CAGAUCUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUU	AAGAUCUG
3406	ACAGAUCU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUA	AGAUCUGU
3411	AAGUCACA	CUGAUGA	X	GAA	AUCUUAAC	GUUAAGAUC	UGUGACUU

3419	CCAAGCCG	CUGAUGA	X	GAA	AGUCACAG	CUGUGACUU	CGGCUUGG
3420	GCCAAGCC	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUC	GGCUUGGC
3425	CCCGGGCC	CUGAUGA	X	GAA	AGCCGAAG	CUUCGGCUU	GGCCCGGG
3438	UCUUUAUA	CUGAUGA	X	GAA	AUGUCCCG	CGGGACAUU	UAUAAAGA
3439	GUCUUUAU	CUGAUGA	X	GAA	AAUGUCCC	GGGACAUUU	AUAAAGAC
3440	GGUCUUUA	CUGAUGA	X	GAA	AAAUGUCC	GGACAUUUA	UAAAGACC
3442	CGGGUCUU	CUGAUGA	X	GAA	AUAAAUGU	ACAUUUAUA	AAGACCCG
3454	UCUGACAU	CUGAUGA	X	GAA	AUCCGGGU	ACCCGGAUU	AUGUCAGA
3455	UUCUGACA	CUGAUGA	X	GAA	AAUCCGGG	CCCGGAUUA	UGUCAGAA
3459	CCUUUUCU	CUGAUGA	X	GAA	ACAUAAUC	GAUUAUGUC	AGAAAAGG
3480	UUCAAAGG	CUGAUGA	X	GAA	AGUCGGGC	GCCCGACUC	CCUUUGAA
3484	CCACUUCA	CUGAUGA	X	GAA	AGGGAGUC	GACUCCCUU	UGAAGUGG
3485	UCCACUUC	CUGAUGA	X	GAA	AAGGGAGU	ACUCCCUUU	GAAGUGGA
3510	CUGUCAAA	CUGAUGA	X	GAA	AUGGUUUC	GAAACCAUU	UUUGACAG
3511	UCUGUCAA	CUGAUGA	X	GAA	AAUGGUUU	AAACCAUUU	UUGACAGA
3512	CUCUGUCA	CUGAUGA	X	GAA	AAAUGGUU	AACCAUUUU	UGACAGAG
3513	ACUCUGUC	CUGAUGA	X	GAA	AAAAUGGU	ACCAUUUUU	GACAGAGU
3522	AUUGUGUA	CUGAUGA	X	GAA	ACUCUGUC	GACAGAGUA	UACACAAU
3524	GAAUUGUG	CUGAUGA	X	GAA	AUACUCUG	CAGAGUAUA	CACAAUUC
3531	UCGCUCUG	CUGAUGA	X	GAA	AUUGUGUA	UACACAAUU	CAGAGCGA
3532	AUCGCUCU	CUGAUGA	X	GAA	AAUUGUGU	ACACAAUUC	AGAGCGAU
3548	CACCGAAA	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	UUUCGGUG
3550	CACACCGA	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	UCGGUGUG
3551	ACACACCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUU	CGGUGUGU
3552	AACACACC	CUGAUGA	X	GAA	AAAGACCA	UGGUCUUUC	GGUGUGUU
3560	CCCAGAGC	CUGAUGA	X	GAA	ACACACCG	CGGUGUGUU	GCUCUGGG
3564	AUUUCCCA	CUGAUGA	X	GAA	AGCAACAC	GUGUUGCUC	UGGGAAAU
3573	AAGGAAAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUA	UUUUCCUU
3575	CUAAGGAA	CUGAUGA	X	GAA	AUAUUUCC	GGAAAUAUU	UUCCUUAG
3576	CCUAAGGA	CUGAUGA	X	GAA	AAUAUUUC	GAAAUAUUU	UCCUUAGG

3577	ACCUAAGG	CUGAUGA	X	GAA	AAAUAUUU	AAAUAUUUU	CCUUAGGU
3578	CACCUAAG	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	CUUAGGUG
3581	AGGCACCU	CUGAUGA	X	GAA	AGGAAAAU	AUUUUCCUU	AGGUGCCU
3582	GAGGCACC	CUGAUGA	X	GAA	AAGGAAAA	UUUUCCUUA	GGUGCCUC
3590	GGUAUGGG	CUGAUGA	X	GAA	AGGCACCU	AGGUGCCUC	CCCAUACC
3596	CCCCAGGG	CUGAUGA	X	GAA	AUGGGGAG	CUCCCCAUA	CCCUGGGG
3606	UCAAUCUU	CUGAUGA	X	GAA	ACCCCAGG	CCUGGGGUC	AAGAUUGA
3612	UCUUCAUC	CUGAUGA	X	GAA	AUCUUGAC	GUCAAGAUU	GAUGAAGA
3623	UCCUACAA	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUU	UUGUAGGA
3624	CUCCUACA	CUGAUGA	X	GAA	AAUUCUUC	GAAGAAUUU	UGUAGGAG
3625	UCUCCUAC	CUGAUGA	X	GAA	AAAUUCUU	AAGAAUUUU	GUAGGAGA
3628	CAAUCUCC	CUGAUGA	X	GAA	ACAAAAUU	AAUUUUGUA	GGAGAUUG
3635	CUUCUUUC	CUGAUGA	X	GAA	AUCUCCUA	UAGGAGAUU	GAAAGAAG
3649	CCGCAUUC	CUGAUGA	X	GAA	AGUUCCUU	AAGGAACUA	GAAUGCGG
3661	GUAGUCAG	CUGAUGA	X	GAA	AGCCCGCA	UGCGGGCUC	CUGACUAC
3668	GGGUAGUG	CUGAUGA	X	GAA	AGUCAGGA	UCCUGACUA	CACUACCC
3673	UUCUGGGG	CUGAUGA	X	GAA	AGUGUAGU	ACUACACUA	CCCCAGAA
3686	UGGUCUGG	CUGAUGA	X	GAA	ACAUUUCU	AGAAAUGUA	CCAGACCA
3734	CUGAAAAC	CUGAUGA	X	GAA	AGGGUCUC	GAGACCCUC	GUUUUCAG
3737	ACUCUGAA	CUGAUGA	X	GAA	ACGAGGGU	ACCCUCGUU	UUCAGAGU
3738	AACUCUGA	CUGAUGA	X	GAA	AACGAGGG	CCCUCGUUU	UCAGAGUU
3739	CAACUCUG	CUGAUGA	X	GAA	AAACGAGG	CCUCGUUUU	CAGAGUUG
3740	CCAACUCU	CUGAUGA	X	GAA	AAAACGAG	CUCGUUUUC	AGAGUUGG
3746	GCUCCACC	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	GGUGGAGC
3757	GUUUCCCA	CUGAUGA	X	GAA	AUGCUCCA	UGGAGCAUU	UGGGAAAC
3758	GGUUUCCC	CUGAUGA	X	GAA	AAUGCUCC	GGAGCAUUU	GGGAAACC
3768	GCUUGCAG	CUGAUGA	X	GAA	AGGUUUCC	GGAAACCUC	CUGCAAGC
3803	GAACAAUA	CUGAUGA	X	GAA	AGUCUUUG	CAAAGACUA	UAUUGUUC
3805	AAGAACAA	CUGAUGA	X	GAA	AUAGUCUU	AAGACUAUA	UUGUUCUU
3807	GGAAGAAC	CUGAUGA	X	GAA	AUAUAGUC	GACUAUAUU	GUUCUUCC

3810	AUUGGAAG	CUGAUGA	X	GAA	ACAAUAUA	UAUAUUGUU	CUUCCAAU
3811	CAUUGGAA	CUGAUGA	X	GAA	AACAAUAU	AUAUUGUUC	UUCCAAUG
3813	GACAUUGG	CUGAUGA	X	GAA	AGAACAAU	AUUGUUCUU	CCAAUGUC
3814	UGACAUUG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUC	CAAUGUCA
3821	GUGUCUCU	CUGAUGA	X	GAA	ACAUUGGA	UCCAAUGUC	AGAGACAC
3847	GAGUCCAG	CUGAUGA	X	GAA	AUCCUCUU	AAGAGGAUU	CUGGACUC
3848	AGAGUCCA	CUGAUGA	X	GAA	AAUCCUCU	AGAGGAUUC	UGGACUCU
3855	GGCAGGGA	CUGAUGA	X	GAA	AGUCCAGA	UCUGGACUC	UCCCUGCC
3857	UAGGCAGG	CUGAUGA	X	GAA	AGAGUCCA	UGGACUCUC	CCUGCCUA
3865	AGGUGAGG	CUGAUGA	X	GAA	AGGCAGGG	CCCUGCCUA	CCUCACCU
3869	AAACAGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCUGUUU
3876	AUACAGGA	CUGAUGA	X	GAA	ACAGGUGA	UCACCUGUU	UCCUGUAU
3877	CAUACAGG	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	CCUGUAUG
3878	CCAUACAG	CUGAUGA	X	GAA	AAACAGGU	ACCUGUUUC	CUGUAUGG
3883	UUCCUCCA	CUGAUGA	X	GAA	ACAGGAAA	UUUCCUGUA	UGGAGGAA
3914	CAUAAUGG	CUGAUGA	X	GAA	AUUUGGGG	CCCCAAAUU	CCAUUAUG
3915	UCAUAAUG	CUGAUGA	X	GAA	AAUUUGGG	CCCAAAUUC	CAUUAUGA
3919	GUUGUCAU	CUGAUGA	X	GAA	AUGGAAUU	AAUUCCAUU	AUGACAAC
3920	UGUUGUCA	CUGAUGA	X	GAA	AAUGGAAU	AUUCCAUUA	UGACAACA
3939	UAAUGACU	CUGAUGA	X	GAA	AUUCCUGC	GCAGGAAUC	AGUCAUUA
3943	GAGAUAAU	CUGAUGA	X	GAA	ACUGAUUC	GAAUCAGUC	AUUAUCUC
3946	CUGGAGAU	CUGAUGA	X	GAA	AUGACUGA	UCAGUCAUU	AUCUCCAG
3947	UCUGGAGA	CUGAUGA	X	GAA	AAUGACUG	CAGUCAUUA	UCUCCAGA
3949	GUUCUGGA	CUGAUGA	X	GAA	AUAAUGAC	GUCAUUAUC	UCCAGAAC
3951	CUGUUCUG	CUGAUGA	X	GAA	AGAUAAUG	CAUUAUCUC	CAGAACAG
3961	CUUUCGCU	CUGAUGA	X	GAA	ACUGUUCU	AGAACAGUA	AGCGAAAG
3987	AAUGUUUU	CUGAUGA	X	GAA	ACACUCAC	GUGAGUGUA	AAAACAUU
3995	UAUCUUCA	CUGAUGA	X	GAA	AUGUUUUU	AAAAACAUU	UGAAGAUA
3996	AUAUCUUC	CUGAUGA	X	GAA	AAUGUUUU	AAAACAUUU	GAAGAUAU
4003	CAAUGGGA	CUGAUGA	X	GAA	AUCUUCAA	UUGAAGAUA	UCCCAUUG

4005	UCCAAUGG	CUGAUGA	X	GAA	AUAUCUUC	GAAGAUAUC	CCAUUGGA
4010	GUUCCUCC	CUGAUGA	X	GAA	AUGGGAUA	UAUCCCAUU	GGAGGAAC
4026	AUCACUUU	CUGAUGA	X	GAA	ACUUCUGG	CCAGAAGUA	AAAGUGAU
4035	UCAUCUGG	CUGAUGA	X	GAA	AUCACUUU	AAAGUGAUC	CCAGAUGA
4068	GAUGCAAG	CUGAUGA	X	GAA	ACCAUCCC	GGGAUGGUC	CUUGCAUC
4071	UCUGAUGC	CUGAUGA	X	GAA	AGGACCAU	AUGGUCCUU	GCAUCAGA
4076	GCUCUUCU	CUGAUGA	X	GAA	AUGCAAGG	CCUUGCAUC	AGAAGAGC
4093	GUCUUCCA	CUGAUGA	X	GAA	AGUUUUCA	UGAAAACUC	UGGAAGAC
4112	AUGGAGAU	CUGAUGA	X	GAA	AUUUGUUC	GAACAAAUU	AUCUCCAU
4113	GAUGGAGA	CUGAUGA	X	GAA	AAUUUGUU	AACAAAUUA	UCUCCAUC
4115	AAGAUGGA	CUGAUGA	X	GAA	AUAAUUUG	CAAAUUAUC	UCCAUCUU
4117	AAAAGAUG	CUGAUGA	X	GAA	AGAUAAUU	AAUUAUCUC	CAUCUUUU
4121	CACCAAAA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUC	UUUUGGUG
4123	UCCACCAA	CUGAUGA	X	GAA	AGAUGGAG	CUCCAUCUU	UUGGUGGA
4124	UUCCACCA	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUU	UGGUGGAA
4125	AUUCCACC	CUGAUGA	X	GAA	AAAGAUGG	CCAUCUUUU	GGUGGAAU
4144	CCUGCUUU	CUGAUGA	X	GAA	ACUGGGCA	UGCCCAGUA	AAAGCAGG
4157	AGGCCACA	CUGAUGA	X	GAA	ACUCCCUG	CAGGGAGUC	UGUGGCCU
4166	AGCCUUCC	CUGAUGA	X	GAA	AGGCCACA	UGUGGCCUC	GGAAGGCU
4175	UCUGGUUG	CUGAUGA	X	GAA	AGCCUUCC	GGAAGGCUC	CAACCAGA
4193	CAGACUGG	CUGAUGA	X	GAA	AGCCACUG	CAGUGGCUA	CCAGUCUG
4199	GAUACCCA	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUC	UGGGUAUC
4205	CUGAGUGA	CUGAUGA	X	GAA	ACCCAGAC	GUCUGGGUA	UCACUCAG
4207	AUCUGAGU	CUGAUGA	X	GAA	AUACCCAG	CUGGGUAUC	ACUCAGAU
4211	UGUCAUCU	CUGAUGA	X	GAA	AGUGAUAC	GUAUCACUC	AGAUGACA
4235	CGCUGGAG	CUGAUGA	X	GAA	ACACGGUG	CACCGUGUA	CUCCAGCG
4238	CGUCGCUG	CUGAUGA	X	GAA	AGUACACG	CGUGUACUC	CAGCGACG
4257	AUCUUUAA	CUGAUGA	X	GAA	AGUCCUGC	GCAGGACUU	UUAAAGAU
4258	CAUCUUUA	CUGAUGA	X	GAA	AAGUCCUG	CAGGACUUU	UAAAGAUG
4259	CCAUCUUU	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUU	AAAGAUGG

4260	ACCAUCUU	CUGAUGA	X	GAA	AAAAGUCC	GGACUUUUA	AAGAUGGU
4281	UCAGCGUG	CUGAUGA	X	GAA	ACUGCAGC	GCUGCAGUU	CACGCUGA
4282	GUCAGCGU	CUGAUGA	X	GAA	AACUGCAG	CUGCAGUUC	ACGCUGAC
4292	UGGUCCCU	CUGAUGA	X	GAA	AGUCAGCG	CGCUGACUC	AGGGACCA
4311	CAGGAGGU	CUGAUGA	X	GAA	AGCUGCAG	CUGCAGCUC	ACCUCCUG
4316	UUAAACAG	CUGAUGA	X	GAA	AGGUGAGC	GCUCACCUC	CUGUUUAA
4321	UCCAUUUA	CUGAUGA	X	GAA	ACAGGAGG	CCUCCUGUU	UAAAUGGA
4322	UUCCAUUU	CUGAUGA	X	GAA	AACAGGAG	CUCCUGUUU	AAAUGGAA
4323	CUUCCAUU	CUGAUGA	X	GAA	AAACAGGA	UCCUGUUUA	AAUGGAAG
4336	CGGGACAG	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUC	CUGUCCCG
4341	GGAGCCGG	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUC	CCGGCUCC
4348	UGGGGGCG	CUGAUGA	X	GAA	AGCCGGGA	UCCCGGCUC	CGCCCCCA
4360	AUUUCCAG	CUGAUGA	X	GAA	AGUUGGGG	CCCCAACUC	CUGGAAAU
4369	UCUCUCGU	CUGAUGA	X	GAA	AUUUCCAG	CUGGAAAUC	ACGAGAGA
4387	GAAAAUCU	CUGAUGA	X	GAA	AGCAGCAC	GUGCUGCUU	AGAUUUUC
4388	UGAAAAUC	CUGAUGA	X	GAA	AAGCAGCA	UGCUGCUUA	GAUUUUCA
4392	CACUUGAA	CUGAUGA	X	GAA	AUCUAAGC	GCUUAGAUU	UUCAAGUG
4393	ACACUUGA	CUGAUGA	X	GAA	AAUCUAAG	CUUAGAUUU	UCAAGUGU
4394	AACACUUG	CUGAUGA	X	GAA	AAAUCUAA	UUAGAUUUU	CAAGUGUU
4395	CAACACUU	CUGAUGA	X	GAA	AAAAUCUA	UAGAUUUUC	AAGUGUUG
4402	GAAAGAAC	CUGAUGA	X	GAA	ACACUUGA	UCAAGUGUU	GUUCUUUC
4405	GUGGAAAG	CUGAUGA	X	GAA	ACAACACU	AGUGUUGUU	CUUUCCAC
4406	GGUGGAAA	CUGAUGA	X	GAA	AACAACAC	GUGUUGUUC	UUUCCACC
4408	GUGGUGGA	CUGAUGA	X	GAA	AGAACAAC	GUUGUUCUU	UCCACCAC
4409	GGUGGUGG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUU	CCACCACC
4410	GGGUGGUG	CUGAUGA	X	GAA	AAAGAACA	UGUUCUUUC	CACCACCC
4425	AAUGUGGC	CUGAUGA	X	GAA	ACUUCCGG	CCGGAAGUA	GCCACAUU
4433	GAAAAUCA	CUGAUGA	X	GAA	AUGUGGCU	AGCCACAUU	UGAUUUUC
4434	UGAAAAUC	CUGAUGA	X	GAA	AAUGUGGC	GCCACAUUU	GAUUUUCA
4438	AAAAUGAA	CUGAUGA	X	GAA	AUCAAAUG	CAUUUGAUU	UUCAUUUU

4439	AAAAAUGA	CUGAUGA	X	GAA	AAUCAAAU	AUUUGAUUU	UCAUUUUU
4440	CAAAAAUG	CUGAUGA	X	GAA	AAAUCAAA	UUUGAUUUU	CAUUUUUG
4441	CCAAAAAU	CUGAUGA	X	GAA	AAAAUCAA	UUGAUUUUC	AUUUUUGG
4444	CCUCCAAA	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUU	UUUGGAGG
4445	UCCUCCAA	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU	UUGGAGGA
4446	CUCCUCCA	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUU	UGGAGGAG
4447	CCUCCUCC	CUGAUGA	X	GAA	AAAAUGAA	UUCAUUUUU	GGAGGAGG
4461	UGCAGUCU	CUGAUGA	X	GAA	AGGUCCCU	AGGGACCUC	AGACUGCA
4477	CUGAGGAC	CUGAUGA	X	GAA	AGCUCCUU	AAGGAGCUU	GUCCUCAG
4480	GCCCUGAG	CUGAUGA	X	GAA	ACAAGCUC	GAGCUUGUC	CUCAGGGC
4483	AAUGCCCU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC	AGGGCAUU
4491	UCUCUGGA	CUGAUGA	X	GAA	AUGCCCUG	CAGGGCAUU	UCCAGAGA
4492	UUCUCUGG	CUGAUGA	X	GAA	AAUGCCCU	AGGGCAUUU	CCAGAGAA
4493	CUUCUCUG	CUGAUGA	X	GAA	AAAUGCCC	GGGCAUUUC	CAGAGAAG
4525	GUAGAGUC	CUGAUGA	X	GAA	ACACAUUC	GAAUGUGUU	GACUCUAC
4530	AGAGAGUA	CUGAUGA	X	GAA	AGUCAACA	UGUUGACUC	UACUCUCU
4532	AAAGAGAG	CUGAUGA	X	GAA	AGAGUCAA	UUGACUCUA	CUCUCUUU
4535	GGAAAAGA	CUGAUGA	X	GAA	AGUAGAGU	ACUCUACUC	UCUUUUCC
4537	AUGGAAAA	CUGAUGA	X	GAA	AGAGUAGA	UCUACUCUC	UUUUCCAU
4539	GAAUGGAA	CUGAUGA	X	GAA	AGAGAGUA	UACUCUCUU	UUCCAUUC
4540	UGAAUGGA	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUU	UCCAUUCA
4541	AUGAAUGG	CUGAUGA	X	GAA	AAAGAGAG	CUCUCUUUU	CCAUUCAU
4542	AAUGAAUG	CUGAUGA	X	GAA	AAAAGAGA	UCUCUUUUC	CAUUCAUU
4546	UUUAAAUG	CUGAUGA	X	GAA	AUGGAAAA	UUUUCCAUU	CAUUUAAA
4547	UUUUAAAU	CUGAUGA	X	GAA	AAUGGAAA	UUUCCAUUC	AUUUAAAA
4550	GACUUUUA	CUGAUGA	X	GAA	AUGAAUGG	CCAUUCAUU	UAAAAGUC
4551	GGACUUUU	CUGAUGA	X	GAA	AAUGAAUG	CAUUCAUUU	AAAAGUCC
4552	AGGACUUU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUA	AAAGUCCU
4558	UUAUAUAG	CUGAUGA	X	GAA	ACUUUUAA	UUAAAAGUC	CUAUAUAA
4561	ACAUUAUA	CUGAUGA	X	GAA	AGGACUUU	AAAGUCCUA	UAUAAUGU

4563	GCACAUUA	CUGAUGA	X	GAA	AUAGGACU	AGUCCUAUA	UAAUGUGC
4565	GGGCACAU	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUA	AUGUGCCC
4583	GGUAGUGA	CUGAUGA	X	GAA	ACCACAGC	GCUGUGGUC	UCACUACC
4585	CUGGUAGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUC	ACUACCAG
4589	UUAACUGG	CUGAUGA	X	GAA	AGUGAGAC	GUCUCACUA	CCAGUUAA
4595	UUUGCUUU	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUU	AAAGCAAA
4596	UUUUGCUU	CUGAUGA	X	GAA	AACUGGUA	UACCAGUUA	AAGCAAAA
4609	GUGUUUGA	CUGAUGA	X	GAA	AGUCUUUU	AAAAGACUU	UCAAACAC
4610	CGUGUUUG	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUU	CAAACACG
4611	ACGUGUUU	CUGAUGA	X	GAA	AAAGUCUU	AAGACUUUC	AAACACGU
4625	GGAGGACA	CUGAUGA	X	GAA	AGUCCACG	CGUGGACUC	UGUCCUCC
4629	UCUUGGAG	CUGAUGA	X	GAA	ACAGAGUC	GACUCUGUC	CUCCAAGA
4632	ACUUCUUG	CUGAUGA	X	GAA	AGGACAGA	UCUGUCCUC	CAAGAAGU
4654	GUUUCACA	CUGAUGA	X	GAA	AGGUGCCG	CGGCACCUC	UGUGAAAC
4668	GCCCAUUC	CUGAUGA	X	GAA	AUCCAGUU	AACUGGAUC	GAAUGGGC
4683	AACACACA	CUGAUGA	X	GAA	AGCAUUGC	GCAAUGCUU	UGUGUGUU
4684	CAACACAC	CUGAUGA	X	GAA	AAGCAUUG	CAAUGCUUU	GUGUGUUG
4691	CCAUCCUC	CUGAUGA	X	GAA	ACACACAA	UUGUGUGUU	GAGGAUGG
4709	GGCCCUGG	CUGAUGA	X	GAA	ACAUCUCA	UGAGAUGUC	CCAGGGCC
4722	GGUAGACA	CUGAUGA	X	GAA	ACUCGGCC	GGCCGAGUC	UGUCUACC
4726	CCAAGGUA	CUGAUGA	X	GAA	ACAGACUC	GAGUCUGUC	UACCUUGG
4728	CUCCAAGG	CUGAUGA	X	GAA	AGACAGAC	GUCUGUCUA	CCUUGGAG
4732	AAGCCUCC	CUGAUGA	X	GAA	AGGUAGAC	GUCUACCUU	GGAGGCUU
4740	CCUCCACA	CUGAUGA	X	GAA	AGCCUCCA	UGGAGGCUU	UGUGGAGG
4741	UCCUCCAC	CUGAUGA	X	GAA	AAGCCUCC	GGAGGCUUU	GUGGAGGA
4758	UUGGCUCA	CUGAUGA	X	GAA	AGCCCGCA	UGCGGGCUA	UGAGCCAA
4771	CCACACUU	CUGAUGA	X	GAA	ACACUUGG	CCAAGUGUU	AAGUGUGG
4772	CCCACACU	CUGAUGA	X	GAA	AACACUUG	CAAGUGUUA	AGUGUGGG
4811	CUCCGAGC	CUGAUGA	X	GAA	ACUUGCGC	GCGCAAGUC	GCUCGGAG
4815	CGCUCUCC	CUGAUGA	X	GAA	AGCGACUU	AAGUCGCUC	GGAGAGCG

4826	CAGGCUCC	CUGAUGA	X	GAA	ACCGCUCU	AGAGCGGUU	GGAGCCUG
4844	GCCAGCAC	CUGAUGA	X	GAA	AUGCAUCU	AGAUGCAUU	GUGCUGGC
4854	CUCCACCA	CUGAUGA	X	GAA	AGCCAGCA	UGCUGGCUC	UGGUGGAG
4870	CAGGCCAC	CUGAUGA	X	GAA	AGCCCACC	GGUGGGCUU	GUGGCCUG
4880	CGUUUCCU	CUGAUGA	X	GAA	ACAGGCCA	UGGCCUGUC	AGGAAACG
4908	CAAAACCA	CUGAUGA	X	GAA	ACCCUGCC	GGCAGGGUU	UGGUUUUG
4909	CCAAAACC	CUGAUGA	X	GAA	AACCCUGC	GCAGGGUUU	GGUUUUGG
4913	CCUUCCAA	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUU	UUGGAAGG
4914	ACCUUCCA	CUGAUGA	X	GAA	AACCAAAC	GUUUGGUUU	UGGAAGGU
4915	AACCUUCC	CUGAUGA	X	GAA	AAACCAAA	UUUGGUUUU	GGAAGGUU
4923	AGCACGCA	CUGAUGA	X	GAA	ACCUUCCA	UGGAAGGUU	UGCGUGCU
4924	GAGCACGC	CUGAUGA	X	GAA	AACCUUCC	GGAAGGUUU	GCGUGCUC
4932	ACUGUGAA	CUGAUGA	X	GAA	AGCACGCA	UGCGUGCUC	UUCACAGU
4934	CGACUGUG	CUGAUGA	X	GAA	AGAGCACG	CGUGCUCUU	CACAGUCG
4935	CCGACUGU	CUGAUGA	X	GAA	AAGAGCAC	GUGCUCUUC	ACAGUCGG
4941	UGUAACCC	CUGAUGA	X	GAA	ACUGUGAA	UUCACAGUC	GGGUUACA
4946	UCGCCUGU	CUGAUGA	X	GAA	ACCCGACU	AGUCGGGUU	ACAGGCGA
4947	CUCGCCUG	CUGAUGA	X	GAA	AACCCGAC	GUCGGGUUA	CAGGCGAG
4957	CCACAGGG	CUGAUGA	X	GAA	ACUCGCCU	AGGCGAGUU	CCCUGUGG
4958	GCCACAGG	CUGAUGA	X	GAA	AACUCGCC	GGCGAGUUC	CCUGUGGC
4969	GAGUAGGA	CUGAUGA	X	GAA	ACGCCACA	UGUGGCGUU	UCCUACUC
4970	GGAGUAGG	CUGAUGA	X	GAA	AACGCCAC	GUGGCGUUU	CCUACUCC
4971	AGGAGUAG	CUGAUGA	X	GAA	AAACGCCA	UGGCGUUUC	CUACUCCU
4974	AUUAGGAG	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	CUCCUAAU
4977	CUCAUUAG	CUGAUGA	X	GAA	AGUAGGAA	UUCCUACUC	CUAAUGAG
4980	ACUCUCAU	CUGAUGA	X	GAA	AGGAGUAG	CUACUCCUA	AUGAGAGU
4989	CCGGAAGG	CUGAUGA	X	GAA	ACUCUCAU	AUGAGAGUU	CCUUCCGG
4990	UCCGGAAG	CUGAUGA	X	GAA	AACUCUCA	UGAGAGUUC	CUUCCGGA
4993	GAGUCCGG	CUGAUGA	X	GAA	AGGAACUC	GAGUUCCUU	CCGGACUC
4994	AGAGUCCG	CUGAUGA	X	GAA	AAGGAACU	AGUUCCUUC	CGGACUCU

5001	ACACGUAA	CUGAUGA	X	GAA	AGUCCGGA	UCCGGACUC	UUACGUGU
5003	AGACACGU	CUGAUGA	X	GAA	AGAGUCCG	CGGACUCUU	ACGUGUCU
5004	GAGACACG	CUGAUGA	X	GAA	AAGAGUCC	GGACUCUUA	CGUGUCUC
5010	GGCCAGGA	CUGAUGA	X	GAA	ACACGUAA	UUACGUGUC	UCCUGGCC
5012	CAGGCCAG	CUGAUGA	X	GAA	AGACACGU	ACGUGUCUC	CUGGCCUG
5046	GAAGGAGC	CUGAUGA	X	GAA	AGCUGCAU	AUGCAGCUU	GCUCCUUC
5050	UGAGGAAG	CUGAUGA	X	GAA	AGCAAGCU	AGCUUGCUC	CUUCCUCA
5053	AGAUGAGG	CUGAUGA	X	GAA	AGGAGCAA	UUGCUCCUU	CCUCAUCU
5054	GAGAUGAG	CUGAUGA	X	GAA	AAGGAGCA	UGCUCCUUC	CUCAUCUC
5057	UGAGAGAU	CUGAUGA	X	GAA	AGGAAGGA	UCCUUCCUC	AUCUCUCA
5060	GCCUGAGA	CUGAUGA	X	GAA	AUGAGGAA	UUCCUCAUC	UCUCAGGC
5062	CAGCCUGA	CUGAUGA	X	GAA	AGAUGAGG	CCUCAUCUC	UCAGGCUG
5064	CACAGCCU	CUGAUGA	X	GAA	AGAGAUGA	UCAUCUCUC	AGGCUGUG
5076	UCUGAAUU	CUGAUGA	X	GAA	AGGCACAG	CUGUGCCUU	AAUUCAGA
5077	UUCUGAAU	CUGAUGA	X	GAA	AAGGCACA	UGUGCCUUA	AUUCAGAA
5080	GUGUUCUG	CUGAUGA	X	GAA	AUUAAGGC	GCCUUAAUU	CAGAACAC
5081	GGUGUUCU	CUGAUGA	X	GAA	AAUUAAGG	CCUUAAUUC	AGAACACC
5105	CCUCUGCC	CUGAUGA	X	GAA	ACGUUCCU	AGGAACGUC	GGCAGAGG
5116	CCCGUCAG	CUGAUGA	X	GAA	AGCCUCUG	CAGAGGCUC	CUGACGGG
5135	GUUCUCAC	CUGAUGA	X	GAA	AUUCUUCG	CGAAGAAUU	GUGAGAAC
5156	GAAACCCU	CUGAUGA	X	GAA	AGUUUCUG	CAGAAACUC	AGGGUUUC
5162	CCAGCAGA	CUGAUGA	X	GAA	ACCCUGAG	CUCAGGGUU	UCUGCUGG
5163	CCCAGCAG	CUGAUGA	X	GAA	AACCCUGA	UCAGGGUUU	CUGCUGGG
5164	ACCCAGCA	CUGAUGA	X	GAA	AAACCCUG	CAGGGUUUC	UGCUGGGU
5203	AACCCUCA	CUGAUGA	X	GAA	ACCUGCCA	UGGCAGGUC	UGAGGGUU
5211	UGACAGAG	CUGAUGA	X	GAA	ACCCUCAG	CUGAGGGUU	CUCUGUCA
5212	UUGACAGA	CUGAUGA	X	GAA	AACCCUCA	UGAGGGUUC	UCUGUCAA
5214	ACUUGACA	CUGAUGA	X	GAA	AGAACCCU	AGGGUUCUC	UGUCAAGU
5218	CGCCACUU	CUGAUGA	X	GAA	ACAGAGAA	UUCUCUGUC	AAGUGGCG
5229	UGAGCCUU	CUGAUGA	X	GAA	ACCGCCAC	GUGGCGGUA	AAGGCUCA

5236	ACCAGCCU	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC AGGCUGGU
5247	AGAGGAAG	CUGAUGA	X	GAA	ACACCAGC	GCUGGUGUU CUUCCUCU
5248	UAGAGGAA	CUGAUGA	X	GAA	AACACCAG	CUGGUGUUC UUCCUCUA
5250	GAUAGAGG	CUGAUGA	X	GAA	AGAACACC	GGUGUUCUU CCUCUAUC
5251	AGAUAGAG	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUC CUCUAUCU
5254	UGGAGAUA	CUGAUGA	X	GAA	AGGAAGAA	UUCUUCCUC UAUCUCCA
5256	AGUGGAGA	CUGAUGA	X	GAA	AGAGGAAG	CUUCCUCUA UCUCCACU
5258	GGAGUGGA	CUGAUGA	X	GAA	AUAGAGGA	UCCUCUAUC UCCACUCC
5260	CAGGAGUG	CUGAUGA	X	GAA	AGAUAGAG	CUCUAUCUC CACUCCUG
5265	CCUGACAG	CUGAUGA	X	GAA	AGUGGAGA	UCUCCACUC CUGUCAGG
5270	GGGGGCCU	CUGAUGA	X	GAA	ACAGGAGU	ACUCCUGUC AGGCCCCC
5283	AUACUGAG	CUGAUGA	X	GAA	ACUUGGGG	CCCCAAGUC CUCAGUAU
5286	AAAAUACU	CUGAUGA	X	GAA	AGGACUUG	CAAGUCCUC AGUAUUUU
5290	AGCUAAAA	CUGAUGA	X	GAA	ACUGAGGA	UCCUCAGUA UUUUAGCU
5292	AAAGCUAA	CUGAUGA	X	GAA	AUACUGAG	CUCAGUAUU UUAGCUUU
5293	CAAAGCUA	CUGAUGA	X	GAA	AAUACUGA	UCAGUAUUU UAGCUUUG
5294	ACAAAGCU	CUGAUGA	X	GAA	AAAUACUG	CAGUAUUUU AGCUUUGU
5295	CACAAAGC	CUGAUGA	X	GAA	AAAAUACU	AGUAUUUUA GCUUUGUG
5299	AAGCCACA	CUGAUGA	X	GAA	AGCUAAAA	UUUUAGCUU UGUGGCUU
5300	GAAGCCAC	CUGAUGA	X	GAA	AAGCUAAA	UUUAGCUUU GUGGCUUC
5307	CCAUCAGG	CUGAUGA	X	GAA	AGCCACAA	UUGUGGCUU CCUGAUGG
5308	GCCAUCAG	CUGAUGA	X	GAA	AAGCCACA	UGUGGCUUC CUGAUGGC
5325	CCAAUUAA	CUGAUGA	X	GAA	AUUUUUCU	AGAAAAAUC UUAAUUGG
5327	AACCAAUU	CUGAUGA	X	GAA	AGAUUUUU	AAAAAUCUU AAUUGGUU
5328	CAACCAAU	CUGAUGA	X	GAA	AAGAUUUU	AAAAUCUUA AUUGGUUG
5331	AACCAACC	CUGAUGA	X	GAA	AUUAAGAU	AUCUUAAUU GGUUGGUU
5335	AGCAAACC	CUGAUGA	X	GAA	ACCAAUUA	UAAUUGGUU GGUUUGCU
5339	GGAGAGCA	CUGAUGA	X	GAA	ACCAACCA	UGGUUGGUU UGCUCUCC
5340	UGGAGAGC	CUGAUGA	X	GAA	AACCAACC	GGUUGGUUU GCUCUCCA
5344	UAUCUGGA	CUGAUGA	X	GAA	AGCAAACC	GGUUUGCUC UCCAGAUA

5346	AUUAUCUG	CUGAUGA	X	GAA	AGAGCAAA	UUUGCUCUC	CAGAUAAU
5352	CUAGUGAU	CUGAUGA	X	GAA	AUCUGGAG	CUCCAGAUA	AUCACUAG
5355	UGGCUAGU	CUGAUGA	X	GAA	AUUAUCUG	CAGAUAAUC	ACUAGCCA
5359	AAUCUGGC	CUGAUGA	X	GAA	AGUGAUUA	UAAUCACUA	GCCAGAUU
5367	AAUUUCGA	CUGAUGA	X	GAA	AUCUGGCU	AGCCAGAUU	UCGAAAUU
5368	UAAUUUCG	CUGAUGA	X	GAA	AAUCUGGC	GCCAGAUUU	CGAAAUUA
5369	GUAAUUUC	CUGAUGA	X	GAA	AAAUCUGG	CCAGAUUUC	GAAAUUAC
5375	UAAAAAGU	CUGAUGA	X	GAA	AUUUCGAA	UUCGAAAUU	ACUUUUUA
5376	CUAAAAAG	CUGAUGA	X	GAA	AAUUUCGA	UCGAAAUUA	CUUUUUAG
5379	CGGCUAAA	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	UUUAGCCG
5380	UCGGCUAA	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUU	UUAGCCGA
5381	CUCGGCUA	CUGAUGA	X	GAA	AAAGUAAU	AUUACUUUU	UAGCCGAG
5382	CCUCGGCU	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUU	AGCCGAGG
5383	ACCUCGGC	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUA	GCCGAGGU
5392	GUUAUCAU	CUGAUGA	X	GAA	ACCUCGGC	GCCGAGGUU	AUGAUAAC
5393	UGUUAUCA	CUGAUGA	X	GAA	AACCUCGG	CCGAGGUUA	UGAUAACA
5398	GUAGAUGU	CUGAUGA	X	GAA	AUCAUAAC	GUUAUGAUA	ACAUCUAC
5403	AUACAGUA	CUGAUGA	X	GAA	AUGUUAUC	GAUAACAUC	UACUGUAU
5405	GGAUACAG	CUGAUGA	X	GAA	AGAUGUUA	UAACAUCUA	CUGUAUCC
5410	CUAAAGGA	CUGAUGA	X	GAA	ACAGUAGA	UCUACUGUA	UCCUUUAG
5412	UUCUAAAG	CUGAUGA	X	GAA	AUACAGUA	UACUGUAUC	CUUUAGAA
5415	AAAUUCUA	CUGAUGA	X	GAA	AGGAUACA	UGUAUCCUU	UAGAAUUU
5416	AAAAUUCU	CUGAUGA	X	GAA	AAGGAUAC	GUAUCCUUU	AGAAUUUU
5417	UAAAAUUC	CUGAUGA	X	GAA	AAAGGAUA	UAUCCUUUA	GAAUUUUA
5422	UAGGUUAA	CUGAUGA	X	GAA	AUUCUAAA	UUUAGAAUU	UUAACCUA
5423	AUAGGUUA	CUGAUGA	X	GAA	AAUUCUAA	UUAGAAUUU	UAACCUAU
5424	UAUAGGUU	CUGAUGA	X	GAA	AAAUUCUA	UAGAAUUUU	AACCUAUA
5425	UUAUAGGU	CUGAUGA	X	GAA	AAAAUUCU	AGAAUUUUA	ACCUAUAA
5430	UAGUUUUA	CUGAUGA	X	GAA	AGGUUAAA	UUUAACCUA	UAAAACUA
5432	CAUAGUUU	CUGAUGA	X	GAA	AUAGGUUA	UAACCUAUA	AAACUAUG

5438	AGUAGACA	CUGAUGA X GAA	AGUUUUAU		AUAAAACUA	UGUCUACU
5442	AACCAGUA	CUGAUGA X GAA	ACAUAGUU		AACUAUGUC	UACUGGUU
5444	GAAACCAG	CUGAUGA X GAA	AGACAUAG		CUAUGUCUA	CUGGUUUC
5450	CAGGCAGA	CUGAUGA X GAA	ACCAGUAG		CUACUGGUU	UCUGCCUG
5451	ACAGGCAG	CUGAUGA X GAA	AACCAGUA		UACUGGUUU	CUGCCUGU
5452	CACAGGCA	CUGAUGA X GAA	AAACCAGU		ACUGGUUUC	UGCCUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

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Table VII: Mouse *flk*-1 VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt. Position	HP Ribozyme Sequence	Substrate
74	GGGACACA AGAA GGGCCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGGCCCA GAC UGUGUCCC
88	GUUAUCCC AGAA GCGGGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCCGCA GCC GGGAUAAC
105	GGAAUCGG AGAA GCCAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUGGCU GAC CCGAUUCC
110	UCCGCGGA AGAA GGUCAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGACCC GAU UCCGCGGA
125	CGGCUGUC AGAA GUGUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACACC GCU GACAGCCG
132	CCAGCCGC AGAA GUCAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGACA GCC GCGGCUGG
138	CUGGCUCC AGAA GCGGCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCCGCG GCU GGAGCCAG
175	CAGCGCAA AGAA GGGGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCCCG GUC UUGCGCUG
199	GUCACAGA AGAA GUAUGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAUACC GCC UCUGUGAC
309	CACAGAGC AGAA GCUAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUAGCU GUC GCUCUGUG
342	CCCACAGA AGAA GCUCGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCGAGCC GCC UCUGUGGG
434	UGCAAGUA AGAA GAAGGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCUUCA GAU UACUUGCA
630	UAGACAUA AGAA GUGGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCACU GUU UAUGUCUA
655	GAAUGGUG AGAA GUAAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUUACA GAU CACCAUUC
739	CGACCCUC AGAA GGGGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCCCCU GCC GAGGGUCG

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807	CUGUUUCC	AGAA	GGAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUCCG	GAU	GGAAACAG
920	ACAUGAUA	AGAA	GAUAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUAUCA	GUC	UAUCAUGU
1002	UUUUCUCC	AGAA	GAUAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUAUCU	GCC	GGAGAAAA
1229	UCUUGAUC	AGAA	GUCCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGGACG	GAU	GAUCAAGA
1365	AUAUCAGG	AGAA	GGGUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUACCCA	GCU	CCUGAUAU
1556	UCUCACCG	AGAA	GGGGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACCCCA	GAU	CGGUGAGA
1629	UUGGCGUA	AGAA	GUGCAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGCACA	GUC	UACGCCAA
1687	UCUGUAGG	AGAA	GGCUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGCCU	GCU	CCUACAGA
1696	UUGGCCGG	AGAA	GUAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUACA	GAC	CCGGCCAA
1796	UUCCUUCA	AGAA	GGGCAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGCCCU	GAU	UGAAGGAA
1950	GGCUGGGC	AGAA	GGUUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAACCU	GCU	GCCCAGCC
1953	GUUGGCUG	AGAA	GCAGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCUGCU	GCC	CAGCCAAC
1985	CAGUGCAC	AGAA	GGGACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUCCCU	GUU	GUGCACUG
2055	CCCAUGUG	AGAA	GAUGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACAUCG	GUC	CACAUGGG
2082	UUCUUGCA	AGAA	GGUGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCA	GUU	UGCAAGAA
2208	UUAUCUUG	AGAA	GAGCAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUGCUCU	GCU	CAAGAUAA
2252	GGAUGAUG	AGAA	GUUUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCAAACA	GCU	CAUCAUCC
2444	UGCGGAUA	AGAA	GGUUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAACCU	GAC	UAUCCGCA
2639	GCUUAACG	AGAA	GUAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUACG	GAC	CGUUAAGC

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2703	GGCAAUUC	AGAA	GGAUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAUCCA	GAU	GAAUUGCC
2777	CUAGUUUC	AGAA	GGUCCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGGACCG	GCU	GAAACUAG
2832	CCAAAAGC	AGAA	GCCUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGGCA	GAC	GCUUUUGG
3199	AAAGCCUG	AGAA	GGCAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGCCA	GCU	CAGGCUUU
3278	GCUCCAAG	AGAA	GGAAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUUCCU	GAC	CUUGGAGC
3304	CACUUGGA	AGAA	GUAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUACA	GCU	UCCAAGUG
3421	CCGGGCCA	AGAA	GAAGUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GACUUCG	GCU	UGGCCCGG
3450	CUGACAUA	AGAA	GGGUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGACCCG	GAU	UAUGUCAG
3475	CAAAGGGA	AGAA	GGCAUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUGCCC	GAC	UCCCUUUG
3663	GUAGUGUA	AGAA	GGAGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCUCCU	GAC	UACACUAC
3689	CCAGCAUG	AGAA	GGUACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUACCA	GAC	CAUGCUGG
3703	CUCAUGCC	AGAA	GUCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGACU	GCU	GGCAUGAG
3860	GUGAGGUA	AGAA	GGGAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUCCCU	GCC	UACCUCAC
3873	AUACAGGA	AGAA	GGUGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCACCU	GUU	UCCUGUAU
4038	UGGCUGUC	AGAA	GGGAUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUCCCA	GAU	GACAGCCA
4181	AGCCACUG	AGAA	GGUUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAACCA	GAC	CAGUGGCU
4196	GAUACCCA	AGAA	GGUAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUACCA	GUC	UGGGUAUC
4212	UCUGUGUC	AGAA	GAGUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCACUCA	GAU	GACACAGA
4278	UCAGCGUG	AGAA	GCAGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCUGCA	GUU	CACGCUGA

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4287	GUCCCUGA	AGAA	GCGUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCACGCU	GAC	UCAGGGAC
4307	AGGAGGUG	AGAA	GCAGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACUGCA	GCU	CACCUCCU
4318	UCCAUUUA	AGAA	GGAGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCUCCU	GUU	UAAAUGGA
4338	GGAGCCGG	AGAA	GGACCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGUCCU	GUC	CCGGCUCC
4344	GGGGGCGG	AGAA	GGGACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUCCCG	GCU	CCGCCCCC
4349	GAGUUGGG	AGAA	GAGCCG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGGCUCC	GCC	CCCAACUC
4383	AAAAUCUA	AGAA	GCACCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGUGCU	GCU	UAGAUUUU
4462	UCCUUGCA	AGAA	GAGGUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GACCUCA	GAC	UGCAAGGA
4574	GAGACCAC	AGAA	GGGCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGCCCU	GCU	GUGGUCUC
4626	UCUUGGAG	AGAA	GAGUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACUCU	GUC	CUCCAAGA
4723	CCAAGGUA	AGAA	GACUCG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGAGUCU	GUC	UACCUUGG
4823	CAGGCUCC	AGAA	GCUCUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGAGCG	GUU	GGAGCCUG
4836	CACAAUGC	AGAA	GCAGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCUGCA	GAU	GCAUUGUG
4896	ACCCUGCC	AGAA	GCCUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAGGCG	GCC	GGCAGGGU
4938	UGUAACCC	AGAA	GUGAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUCACA	GUC	GGGUUACA
4996	ACGUAAGA	AGAA	GGAAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUUCCG	GAC	UCUUACGU
5042	AAGGAGCA	AGAA	GCAUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAUGCA	GCU	UGCUCCUU
5118	UCGGCCCC	AGAA	GGAGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCUCCU	GAC	GGGGCCGA
5165	CUCCACCC	AGAA	GAAACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUUUCU	GCU	GGGUGGAG

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5310	UUUCUGCC	AGAA	GGAAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUUCCU	GAU	GGCAGAAA
5363	AUUUCGAA	AGAA	GGCUAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUAGCCA	GAU	UUCGAAAU
5453	AGCACACA	AGAA	GAAACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUUUCU	GCC	UGUGUGCU

Table VIII: Mouse *flt*-1 VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Position	HH Ribozyme Sequence	Substrate
17	GUGAGCAA CUGAUGA X GAA ACGCGGCC	GGCCGCGUC UUGCUCAC
19	UGGUGAGC CUGAUGA X GAA AGACGCGG	CCGCGUCUU GCUCACCA
23	ACCAUGGU CUGAUGA X GAA AGCAAGAC	GUCUUGCUC ACCAUGGU
32	CAGCAGCU CUGAUGA X GAA ACCAUGGU	ACCAUGGUC AGCUGCUG
53	UAAGGCAA CUGAUGA X GAA ACCGCGGU	ACCGCGGUC UUGCCUUA
55	CGUAAGGC CUGAUGA X GAA AGACCGCG	CGCGGUCUU GCCUUACG
60	CAGCGCGU CUGAUGA X GAA AGGCAAGA	UCUUGCCUU ACGCGCUG
61	GCAGCGCG CUGAUGA X GAA AAGGCAAG	CUUGCCUUA CGCGCUGC
71	AGACACCC CUGAUGA X GAA AGCAGCGC	GCGCUGCUC GGGUGUCU
78	GAGAAGCA CUGAUGA X GAA ACACCCGA	UCGGGUGUC UGCUUCUC
83	CCUGUGAG CUGAUGA X GAA AGCAGACA	UGUCUGCUU CUCACAGG
84	UCCUGUGA CUGAUGA X GAA AAGCAGAC	GUCUGCUUC UCACAGGA
86	UAUCCUGU CUGAUGA X GAA AGAAGCAG	CUGCUUCUC ACAGGAUA
94	CUGAGCCA CUGAUGA X GAA AUCCUGUG	CACAGGAUA UGGCUCAG
100	UCGACCCU CUGAUGA X GAA AGCCAUAU	AUAUGGCUC AGGGUCGA
106	UUAACUUC CUGAUGA X GAA ACCCUGAG	CUCAGGGUC GAAGUUAA
112	GCACUUUU CUGAUGA X GAA ACUUCGAC	GUCGAAGUU AAAAGUGC
113	GGCACUUU CUGAUGA X GAA AACUUCGA	UCGAAGUUA AAAGUGCC
132	GCCUUUUA CUGAUGA X GAA ACUCAGUU	AACUGAGUU UAAAAGGC
133	UGCCUUUU CUGAUGA X GAA AACUCAGU	ACUGAGUUU AAAAGGCA
134	GUGCCUUU CUGAUGA X GAA AAACUCAG	CUGAGUUUA AAAGGCAC
152	GCUUGCAU CUGAUGA X GAA ACAUGCUG	CAGCAUGUC AUGCAAGC
171	GAGAAAGA CUGAUGA X GAA AGUCUGGC	GCCAGACUC UCUUUCUC
173	UUGAGAAA CUGAUGA X GAA AGAGUCUG	CAGACUCUC UUUCUCAA
175	ACUUGAGA CUGAUGA X GAA AGAGAGUC	GACUCUCUU UCUCAAGU
176	CACUUGAG CUGAUGA X GAA AAGAGAGU	ACUCUCUUU CUCAAGUG
177	GCACUUGA CUGAUGA X GAA AAAGAGAG	CUCUCUUUC UCAAGUGC

179	CUGCACUU CUGAUGA X GAA AGAAAGAG	CUCUUUCUC AAGUGCAG
205	GAGACCAU CUGAUGA X GAA AGUGGGCU	AGCCCACUC AUGGUCUC
211	UGGGCAGA CUGAUGA X GAA ACCAUGAG	CUCAUGGUC UCUGCCCA
213	CGUGGGCA CUGAUGA X GAA AGACCAUG	CAUGGUCUC UGCCCACG
254	GGGGGAGU CUGAUGA X GAA AUGCUCAG	CUGAGCAUC ACUCCCCC
258	CGAUGGGG CUGAUGA X GAA AGUGAUGC	GCAUCACUC CCCCAUCG
265	CACAGGCC CUGAUGA X GAA AUGGGGGA	UCCCCCAUC GGCCUGUG
282	UUGCCUGU CUGAUGA X GAA AUCCCUCC	GGAGGGAUA ACAGGCAA
292	UGCUGCAG CUGAUGA X GAA AUUGCCUG	CAGGCAAUU CUGCAGCA
293	GUGCUGCA CUGAUGA X GAA AAUUGCCU	AGGCAAUUC UGCAGCAC
304	CCAAGGUC CUGAUGA X GAA AGGUGCUG	CAGCACCUU GACCUUGG
310	CCGUGUCC CUGAUGA X GAA AGGUCAAG	CUUGACCUU GGACACGG
341	CAGGUGUA CUGAUGA X GAA AGGCCCGU	ACGGGCCUC UACACCUG
343	UACAGGUG CUGAUGA X GAA AGAGGCCC	GGGCCUCUA CACCUGUA
351	GAGGUAUC CUGAUGA X GAA ACAGGUGU	ACACCUGUA GAUACCUC
355	UAGGGAGG CUGAUGA X GAA AUCUACAG	CUGUAGAUA CCUCCCUA
359	GAUGUAGG CUGAUGA X GAA AGGUAUCU	AGAUACCUC CCUACAUC
363	AGUAGAUG CUGAUGA X GAA AGGGAGGU	ACCUCCCUA CAUCUACU
367	UCGAAGUA CUGAUGA X GAA AUGUAGGG	CCCUACAUC UACUUCGA
369	CUUCGAAG CUGAUGA X GAA AGAUGUAG	CUACAUCUA CUUCGAAG
372	UUUCUUCG CUGAUGA X GAA AGUAGAUG	CAUCUACUU CGAAGAAA
373	UUUUCUUC CUGAUGA X GAA AAGUAGAU	AUCUACUUC GAAGAAAA
394	AGAUUGAA CUGAUGA X GAA AUUCCGCU	AGCGGAAUC UUCAAUCU
396	GUAGAUUG CUGAUGA X GAA AGAUUCCG	CGGAAUCUU CAAUCUAC
397	UGUAGAUU CUGAUGA X GAA AAGAUUCC	GGAAUCUUC AAUCUACA
401	AAUAUGUA CUGAUGA X GAA AUUGAAGA	UCUUCAAUC UACAUAUU
403	CAAAUAUG CUGAUGA X GAA AGAUUGAA	UUCAAUCUA CAUAUUUG
407	CUAACAAA CUGAUGA X GAA AUGUAGAU	AUCUACAUA UUUGUUAG
409	CACUAACA CUGAUGA X GAA AUAUGUAG	CUACAUAUU UGUUAGUG
410	UCACUAAC CUGAUGA X GAA AAUAUGUA	UACAUAUUU GUUAGUGA
413	GCAUCACU CUGAUGA X GAA ACAAAUAU	AUAUUUGUU AGUGAUGC
414	UGCAUCAC CUGAUGA X GAA AACAAAUA	UAUUUGUUA GUGAUGCA
429	UAUGAAAG CUGAUGA X GAA ACUCCCUG	CAGGGAGUC CUUUCAUA

432	CUCUAUGA	CUGAUGA	X	GAA	AGGACUCC	GGAGUCCUU	UCAUAGAG
433	UCUCUAUG	CUGAUGA	X	GAA	AAGGACUC	GAGUCCUUU	CAUAGAGA
434	AUCUCUAU	CUGAUGA	X	GAA	AAAGGACU	AGUCCUUUC	AUAGAGAU
437	UGCAUCUC	CUGAUGA	X	GAA	AUGAAAGG	CCUUUCAUA	GAGAUGCA
455	AGUUUGGG	CUGAUGA	X	GAA	AUGUCAGU	ACUGACAUA	CCCAAACU
464	AUGUGCAC	CUGAUGA	X	GAA	AGUUUGGG	CCCAAACUU	GUGCACAU
491	GGGAUGAU	CUGAUGA	X	GAA	AGCUGUCU	AGACAGCUC	AUCAUCCC
494	CAGGGGAU	CUGAUGA	X	GAA	AUGAGCUG	CAGCUCAUC	AUCCCCUG
497	CGGCAGGG	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUC	CCCUGCCG
514	CGUUGGGU	CUGAUGA	X	GAA	ACGUCACC	GGUGACGUC	ACCCAACG
524	GUGACUGU	CUGAUGA	X	GAA	ACGUUGGG	CCCAACGUC	ACAGUCAC
530	UUUAGGGU	CUGAUGA	X	GAA	ACUGUGAC	GUCACAGUC	ACCCUAAA
536	AACUUUUU	CUGAUGA	X	GAA	AGGGUGAC	GUCACCCUA	AAAAAGUU
544	CAAAUGGA	CUGAUGA	X	GAA	ACUUUUUU	AAAAAAGUU	UCCAUUUG
545	UCAAAUGG	CUGAUGA	X	GAA	AACUUUUU	AAAAAGUUU	CCAUUUGA
546	AUCAAAUG	CUGAUGA	X	GAA	AAACUUUU	AAAAGUUUC	CAUUUGAU
550	GAGUAUCA	CUGAUGA	X	GAA	AUGGAAAC	GUUUCCAUU	UGAUACUC
551	AGAGUAUC	CUGAUGA	X	GAA	AAUGGAAA	UUUCCAUUU	GAUACUCU
555	GGUAAGAG	CUGAUGA	X	GAA	AUCAAAUG	CAUUUGAUA	CUCUUACC
558	AGGGGUAA	CUGAUGA	X	GAA	AGUAUCAA	UUGAUACUC	UUACCCCU
560	UCAGGGGU	CUGAUGA	X	GAA	AGAGUAUC	GAUACUCUU	ACCCCUGA
561	AUCAGGGG	CUGAUGA	X	GAA	AAGAGUAU	AUACUCUUA	CCCCUGAU
581	UCCCAUGU	CUGAUGA	X	GAA	AUUCUUUG	CAAAGAAUA	ACAUGGGA
594	GCCUCUCC	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUA	GGAGAGGC
604	CUAUUAUA	CUGAUGA	X	GAA	AGCCUCUC	GAGAGGCUU	UAUAAUAG
605	GCUAUUAU	CUGAUGA	X	GAA	AAGCCUCU	AGAGGCUUU	AUAAUAGC
606	UGCUAUUA	CUGAUGA	X	GAA	AAAGCCUC	GAGGCUUUA	UAAUAGCA
608	UUUGCUAU	CUGAUGA	X	GAA	AUAAAGCC	GGCUUUAUA	AUAGCAAA
611	GCAUUUGC	CUGAUGA	X	GAA	AUUAUAAA	UUUAUAAUA	GCAAAUGC
625	UCUCUUUG	CUGAUGA	X	GAA	ACGUUGCA	UGCAACGUA	CAAAGAGA
635	AGCAGUCC	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUA	GGACUGCU
662	UGCCCGUU	CUGAUGA	X	GAA	ACGGUGGC	GCCACCGUC	AACGGGCA
676	UUGUCUGG	CUGAUGA	X	GAA	ACAGGUGC	GCACCUGUA	CCAGACAA

688	GGGUCAGA CUGAUGA X GAA AGUUUGUC	GACAAACUA UCUGACCC
690	AUGGGUCA CUGAUGA X GAA AUAGUUUG	CAAACUAUC UGACCCAU
699	GGUCUGCC CUGAUGA X GAA AUGGGUCA	UGACCCAUC GGCAGACC
711	UAGGAUUG CUGAUGA X GAA AUUGGUCU	AGACCAAUA CAAUCCUA
716	ACAUCUAG CUGAUGA X GAA AUUGUAUU	AAUACAAUC CUAGAUGU
719	UGGACAUC CUGAUGA X GAA AGGAUUGU	ACAAUCCUA GAUGUCCA
725	CGUAUUUG CUGAUGA X GAA ACAUCUAG	CUAGAUGUC CAAAUACG
731	GGCGGGCG CUGAUGA X GAA AUUUGGAC	GUCCAAAUA CGCCCGCC
758	UGCCCGUG CUGAUGA X GAA AGCAGUCU	AGACUGCUC CACGGGCA
771	GAGGACAA CUGAUGA X GAA AGUCUGCC	GGCAGACUC UUGUCCUC
773	UUGAGGAC CUGAUGA X GAA AGAGUCUG	CAGACUCUU GUCCUCAA
776	CAGUUGAG CUGAUGA X GAA ACAAGAGU	ACUCUUGUC CUCAACUG
779	GUGCAGUU CUGAUGA X GAA AGGACAAG	CUUGUCCUC AACUGCAC
803	CUCGUAUU CUGAUGA X GAA AGCUCCGU	ACGGAGCUC AAUACGAG
807	CACCCUCG CUGAUGA X GAA AUUGAGCU	AGCUCAAUA CGAGGGUG
831	ACCAGGGU CUGAUGA X GAA AUUCCAGC	GCUGGAAUU ACCCUGGU
832	UACCAGGG CUGAUGA X GAA AAUUCCAG	CUGGAAUUA CCCUGGUA
840	AGUUGCUU CUGAUGA X GAA ACCAGGGU	ACCCUGGUA AAGCAACU
849	UGCUCUCU CUGAUGA X GAA AGUUGCUU	AAGCAACUA AGAGAGCA
859	GCCUUAUA CUGAUGA X GAA AUGCUCUC	GAGAGCAUC UAUAAGGC
861	CUGCCUUA CUGAUGA X GAA AGAUGCUC	GAGCAUCUA UAAGGCAG
863	CGCUGCCU CUGAUGA X GAA AUAGAUGC	GCAUCUAUA AGGCAGCG
875	CUCCGGUC CUGAUGA X GAA AUCCGCUG	CAGCGGAUU GACCGGAG
888	GUUGUGGG CUGAUGA X GAA AUGGCUCC	GGAGCCAUU CCCACAAC
889	UGUUGUGG CUGAUGA X GAA AAUGGCUC	GAGCCAUUC CCACAACA
904	CACUGUGG CUGAUGA X GAA ACACAUUG	CAAUGUGUU CCACAGUG
905	ACACUGUG CUGAUGA X GAA AACACAUU	AAUGUGUUC CACAGUGU
914	AUCUUAAG CUGAUGA X GAA ACACUGUG	CACAGUGUU CUUAAGAU
915	GAUCUUAA CUGAUGA X GAA AACACUGU	ACAGUGUUC UUAAGAUC
917	UUGAUCUU CUGAUGA X GAA AGAACACU	AGUGUUCUU AAGAUCAA
918	GUUGAUCU CUGAUGA X GAA AAGAACAC	GUGUUCUUA AGAUCAAC
923	ACAUUGUU CUGAUGA X GAA AUCUUAAG	CUUAAGAUC AACAAUGU
953	CAGGUGUA CUGAUGA X GAA AGCCCCUU	AAGGGGCUC UACACCUG

955	GACAGGUG	CUGAUGA	X	GAA	AGAGCCCC	GGGGCUCUA	CACCUGUC
963	CUUCACGC	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUC	GCGUGAAG
979	GGAACGAG	CUGAUGA	X	GAA	ACCCACUC	GAGUGGGUC	CUCGUUCC
982	ACUGGAAC	CUGAUGA	X	GAA	AGGACCCA	UGGGUCCUC	GUUCCAGU
985	AAGACUGG	CUGAUGA	X	GAA	ACGAGGAC	GUCCUCGUU	CCAGUCUU
986	AAAGACUG	CUGAUGA	X	GAA	AACGAGGA	UCCUCGUUC	CAGUCUUU
991	UGUUGAAA	CUGAUGA	X	GAA	ACUGGAAC	GUUCCAGUC	UUUCAACA
993	GGUGUUGA	CUGAUGA	X	GAA	AGACUGGA	UCCAGUCUU	UCAACACC
994	AGGUGUUG	CUGAUGA	X	GAA	AAGACUGG	CCAGUCUUU	CAACACCU
995	GAGGUGUU	CUGAUGA	X	GAA	AAAGACUG	CAGUCUUUC	AACACCUC
1003	CAUGCACG	CUGAUGA	X	GAA	AGGUGUUG	CAACACCUC	CGUGCAUG
1015	CUUUUUCA	CUGAUGA	X	GAA	ACACAUGC	GCAUGUGUA	UGAAAAAG
1027	CACUGAUG	CUGAUGA	X	GAA	AUCCUUUU	AAAAGGAUU	CAUCAGUG
1028	ACACUGAU	CUGAUGA	X	GAA	AAUCCUUU	AAAGGAUUC	AUCAGUGU
1031	UUCACACU	CUGAUGA	X	GAA	AUGAAUCC	GGAUUCAUC	AGUGUGAA
1044	CUGCUUCC	CUGAUGA	X	GAA	AUGUUUCA	UGAAACAUC	GGAAGCAG
1084	GCCGAUAG	CUGAUGA	X	GAA	ACCGUCUU	AAGACGGUC	CUAUCGGC
1087	ACAGCCGA	CUGAUGA	X	GAA	AGGACCGU	ACGGUCCUA	UCGGCUGU
1089	GGACAGCC	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUC	GGCUGUCC
1096	CUUUCAUG	CUGAUGA	X	GAA	ACAGCCGA	UCGGCUGUC	CAUGAAAG
1114	GGGAGGGG	CUGAUGA	X	GAA	AGGCCUUC	GAAGGCCUU	CCCCUCCC
1115	GGGGAGGG	CUGAUGA	X	GAA	AAGGCCUU	AAGGCCUUC	CCCUCCCC
1120	UUUCUGGG	CUGAUGA	X	GAA	AGGGGAAG	CUUCCCCUC	CCCAGAAA
1130	AACCAUAC	CUGAUGA	X	GAA	AUUUCUGG	CCAGAAAUC	GUAUGGUU
1133	UUUAACCA	CUGAUGA	X	GAA	ACGAUUUC	GAAAUCGUA	UGGUUAAA
1138	CAUCUUUU	CUGAUGA	X	GAA	ACCAUACG	CGUAUGGUU	AAAAGAUG
1139	CCAUCUUU	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUA	AAAGAUGG
1150	UUGCAGGC	CUGAUGA	X	GAA	AGCCAUCU	AGAUGGCUC	GCCUGCAA
1162	CAGACUUC	CUGAUGA	X	GAA	AUGUUGCA	UGCAACAUU	GAAGUCUG
1168	AGCGAGCA	CUGAUGA	X	GAA	ACUUCAAU	AUUGAAGUC	UGCUCGCU
1173	CAAAUAGC	CUGAUGA	X	GAA	AGCAGACU	AGUCUGCUC	GCUAUUUG
1177	GUACCAAA	CUGAUGA	X	GAA	AGCGAGCA	UGCUCGCUA	UUUGGUAC
1179	AUGUACCA	CUGAUGA	X	GAA	AUAGCGAG	CUCGCUAUU	UGGUACAU

1180	CAUGUACC CUGAUGA X GAA AAUAGCGA	UCGCUAUUU GGUACAUG
1184	UAGCCAUG CUGAUGA X GAA ACCAAAUA	UAUUUGGUA CAUGGCUA
1192	UUAAUGAG CUGAUGA X GAA AGCCAUGU	ACAUGGCUA CUCAUUAA
1195	UAAUUAAU CUGAUGA X GAA AGUAGCCA	UGGCUACUC AUUAAUUA
1198	UGAUAAUU CUGAUGA X GAA AUGAGUAG	CUACUCAUU AAUUAUCA
1199	UUGAUAAU CUGAUGA X GAA AAUGAGUA	UACUCAUUA AUUAUCAA
1202	UCUUUGAU CUGAUGA X GAA AUUAAUGA	UCAUUAAUU AUCAAAGA
1203	AUCUUUGA CUGAUGA X GAA AAUUAAUG	CAUUAAUUA UCAAAGAU
1205	ACAUCUUU CUGAUGA X GAA AUAAUUAA	UUAAUUAUC AAAGAUGU
1237	AGAUCGUA CUGAUGA X GAA AGUCCCCU	AGGGGACUA UACGAUCU
1239	CAAGAUCG CUGAUGA X GAA AUAGUCCC	GGGACUAUA CGAUCUUG
1244	CCCAGCAA CUGAUGA X GAA AUCGUAUA	UAUACGAUC UUGCUGGG
1246	UGCCCAGC CUGAUGA X GAA AGAUCGUA	UACGAUCUU GCUGGGCA
1256	GACUGCUU CUGAUGA X GAA AUGCCCAG	CUGGGCAUA AAGCAGUC
1264	AUAGCCUU CUGAUGA X GAA ACUGCUUU	AAAGCAGUC AAGGCUAU
1271	UUUUUAAA CUGAUGA X GAA AGCCUUGA	UCAAGGCUA UUUAAAAA
1273	GGUUUUUA CUGAUGA X GAA AUAGCCUU	AAGGCUAUU UAAAAACC
1274	AGGUUUUU CUGAUGA X GAA AAUAGCCU	AGGCUAUUU AAAAACCU
1275	GAGGUUUU CUGAUGA X GAA AAAUAGCC	GGCUAUUUA AAAACCUC
1283	GUGGCAGU CUGAUGA X GAA AGGUUUUU	AAAAACCUC ACUGCCAC
1293	UACAAUGA CUGAUGA X GAA AGUGGCAG	CUGCCACUC UCAUUGUA
1295	UUUACAAU CUGAUGA X GAA AGAGUGGC	GCCACUCUC AUUGUAAA
1298	ACGUUUAC CUGAUGA X GAA AUGAGAGU	ACUCUCAUU GUAAACGU
1301	UUCACGUU CUGAUGA X GAA ACAAUGAG	CUCAUUGUA AACGUGAA
1314	GUAGAUCU CUGAUGA X GAA AGGUUUCA	UGAAACCUC AGAUCUAC
1319	UUUUCGUA CUGAUGA X GAA AUCUGAGG	CCUCAGAUC UACGAAAA
1321	ACUUUUCG CUGAUGA X GAA AGAUCUGA	UCAGAUCUA CGAAAAGU
1330	AGGACACG CUGAUGA X GAA ACUUUUCG	CGAAAAGUC CGUGUCCU
1336	GAAGCGAG CUGAUGA X GAA ACACGGAC	GUCCGUGUC CUCGCUUC
1339	UUGGAAGC CUGAUGA X GAA AGGACACG	CGUGUCCUC GCUUCCAA
1343	GGGCUUGG CUGAUGA X GAA AGCGAGGA	UCCUCGCUU CCAAGCCC
1344	UGGGCUUG CUGAUGA X GAA AAGCGAGG	CCUCGCUUC CAAGCCCA
1356	CGGAUAGA CUGAUGA X GAA AGGUGGGC	GCCCACCUC UCUAUCCG

1358	AGCGGAUA CUGAUGA X GAA AGAGGUGG	CCACCUCUC UAUCCGCU
1360	CCAGCGGA CUGAUGA X GAA AGAGAGGU	ACCUCUCUA UCCGCUGG
1362	GCCCAGCG CUGAUGA X GAA AUAGAGAG	CUCUCUAUC CGCUGGGC
1382	CAAGUGAG CUGAUGA X GAA ACUUGUCU	AGACAAGUC CUCACUUG
1385	GUGCAAGU CUGAUGA X GAA AGGACUUG	CAAGUCCUC ACUUGCAC
1389	CACGGUGC CUGAUGA X GAA AGUGAGGA	UCCUCACUU GCACCGUG
1399	GGAUGCCA CUGAUGA X GAA ACACGGUG	CACCGUGUA UGGCAUCC
1406	GGCCGAGG CUGAUGA X GAA AUGCCAUA	UAUGGCAUC CCUCGGCC
1410	UGUUGGCC CUGAUGA X GAA AGGGAUGC	GCAUCCCUC GGCCAACA
1421	AGCCACGU CUGAUGA X GAA AUUGUUGG	CCAACAAUC ACGUGGCU
1430	GGGUGCCA CUGAUGA X GAA AGCCACGU	ACGUGGCUC UGGCACCC
1443	AUUGUGGU CUGAUGA X GAA ACAGGGGU	ACCCCUGUC ACCACAAU
1452	UUUGGAGU CUGAUGA X GAA AUUGUGGU	ACCACAAUC ACUCCAAA
1456	UUUCUUUG CUGAUGA X GAA AGUGAUUG	CAAUCACUC CAAAGAAA
1468	AGAAGUCA CUGAUGA X GAA ACCUUUCU	AGAAAGGUA UGACUUCU
1474	CAGUGCAG CUGAUGA X GAA AGUCAUAC	GUAUGACUU CUGCACUG
1475	UCAGUGCA CUGAUGA X GAA AAGUCAUA	UAUGACUUC UGCACUGA
1495	GGAUAAAG CUGAUGA X GAA AUUCUUCA	UGAAGAAUC CUUUAUCC
1498	CCAGGAUA CUGAUGA X GAA AGGAUUCU	AGAAUCCUU UAUCCUGG
1499	UCCAGGAU CUGAUGA X GAA AAGGAUUC	GAAUCCUUU AUCCUGGA
1500	AUCCAGGA CUGAUGA X GAA AAAGGAUU	AAUCCUUUA UCCUGGAU
1502	GGAUCCAG CUGAUGA X GAA AUAAAGGA	UCCUUUAUC CUGGAUCC
1509	GCUGCUGG CUGAUGA X GAA AUCCAGGA	UCCUGGAUC CCAGCAGC
1522	UGUUUCCU CUGAUGA X GAA AGUUGCUG	CAGCAACUU AGGAAACA
1523	CUGUUUCC CUGAUGA X GAA AAGUUGCU	AGCAACUUA GGAAACAG
1535	AUGCUCUC CUGAUGA X GAA AUUCUGUU	AACAGAAUU GAGAGCAU
1544	CGCUGAGA CUGAUGA X GAA AUGCUCUC	GAGAGCAUC UCUCAGCG
1546	UGCGCUGA CUGAUGA X GAA AGAUGCUC	GAGCAUCUC UCAGCGCA
1548	CAUGCGCU CUGAUGA X GAA AGAGAUGC	GCAUCUCUC AGCGCAUG
1562	CCUUCUAU CUGAUGA X GAA ACCGUCAU	AUGACGGUC AUAGAAGG
1565	GUUCCUUC CUGAUGA X GAA AUGACCGU	ACGGUCAUA GAAGGAAC
1578	AACCGUCU CUGAUGA X GAA AUUUGUUC	GAACAAAUA AGACGGUU
1586	AAUGUGCU CUGAUGA X GAA ACCGUCUU	AAGACGGUU AGCACAUU

1587	CAAUGUGC CUGAUGA X GAA AACCGUCU	AGACGGUUA GCACAUUG
1594	CCACCACC CUGAUGA X GAA AUGUGCUA	UAGCACAUU GGUGGUGG
1609	GGGUCUGA CUGAUGA X GAA AGUCAGCC	GGCUGACUC UCAGACCC
1611	AGGGGUCU CUGAUGA X GAA AGAGUCAG	CUGACUCUC AGACCCCU
1625	CAGCUGUA CUGAUGA X GAA AUUCCAGG	CCUGGAAUC UACAGCUG
1627	GGCAGCUG CUGAUGA X GAA AGAUUCCA	UGGAAUCUA CAGCUGCC
1642	UUUUAUUG CUGAUGA X GAA AGGCCCGG	CCGGGCCUU CAAUAAAA
1643	AUUUUAUU CUGAUGA X GAA AAGGCCCG	CGGGCCUUC AAUAAAAU
1647	CCCUAUUU CUGAUGA X GAA AUUGAAGG	CCUUCAAUA AAAUAGGG
1652	ACAGUCCC CUGAUGA X GAA AUUUUAUU	AAUAAAAUA GGGACUGU
1673	UAAAAUUU CUGAUGA X GAA AUGUUUCU	AGAAACAUA AAAUUUUA
1678	UGACAUAA CUGAUGA X GAA AUUUUAUG	CAUAAAAUU UUAUGUCA
1679	GUGACAUA CUGAUGA X GAA AAUUUUAU	AUAAAAUUU UAUGUCAC
1680	UGUGACAU CUGAUGA X GAA AAAUUUUA	UAAAAUUUU AUGUCACA
1681	CUGUGACA CUGAUGA X GAA AAAAUUUU	AAAAUUUUA UGUCACAG
1685	ACAUCUGU CUGAUGA X GAA ACAUAAAA	UUUUAUGUC ACAGAUGU
1705	AAACGUGA CUGAUGA X GAA AGCCAUUC	GAAUGGCUU UCACGUUU
1706	GAAACGUG CUGAUGA X GAA AAGCCAUU	AAUGGCUUU CACGUUUC
1707	GGAAACGU CUGAUGA X GAA AAAGCCAU	AUGGCUUUC ACGUUUCC
1712	UCCAAGGA CUGAUGA X GAA ACGUGAAA	UUUCACGUU UCCUUGGA
1713	UUCCAAGG CUGAUGA X GAA AACGUGAA	UUCACGUUU CCUUGGAA
1714	UUUCCAAG CUGAUGA X GAA AAACGUGA	UCACGUUUC CUUGGAAA
1717	UCUUUUCC CUGAUGA X GAA AGGAAACG	CGUUUCCUU GGAAAAGA
1756	CCACACAG CUGAUGA X GAA ACAGUUUC	GAAACUGUC CUGUGUGG
1766	AAUUUAUU CUGAUGA X GAA ACCACACA	UGUGUGGUC AAUAAAUU
1770	CAGGAAUU CUGAUGA X GAA AUUGACCA	UGGUCAAUA AAUUCCUG
1774	UGUACAGG CUGAUGA X GAA AUUUAUUG	CAAUAAAUU CCUGUACA
1775	CUGUACAG CUGAUGA X GAA AAUUUAUU	AAUAAAUUC CUGUACAG
1780	UGUCUCUG CUGAUGA X GAA ACAGGAAU	AUUCCUGUA CAGAGACA
1790	AUCCAGGU CUGAUGA X GAA AUGUCUCU	AGAGACAUU ACCUGGAU
1791	AAUCCAGG CUGAUGA X GAA AAUGUCUC	GAGACAUUA CCUGGAUU
1799	CGUAGCAG CUGAUGA X GAA AUCCAGGU	ACCUGGAUU CUGCUACG
1800	CCGUAGCA CUGAUGA X GAA AAUCCAGG	CCUGGAUUC UGCUACGG

1805	ACUGUCCG CUGAUGA X GAA AGCAGAAU	AUUCUGCUA CGGACAGU
1814	CUGUUGUU CUGAUGA X GAA ACUGUCCG	CGGACAGUU AACAACAG
1815	UCUGUUGU CUGAUGA X GAA AACUGUCC	GGACAGUUA ACAACAGA
1836	GCUGAUAC CUGAUGA X GAA AUGGUGCA	UGCACCAUA GUAUCAGC
1839	CUUGCUGA CUGAUGA X GAA ACUAUGGU	ACCAUAGUA UCAGCAAG
1841	UGCUUGCU CUGAUGA X GAA AUACUAUG	CAUAGUAUC AGCAAGCA
1866	GUAAUCUU CUGAUGA X GAA AGUGGUGG	CCACCACUC AAGAUUAC
1872	GAUGGAGU CUGAUGA X GAA AUCUUGAG	CUCAAGAUU ACUCCAUC
1873	UGAUGGAG CUGAUGA X GAA AAUCUUGA	UCAAGAUUA CUCCAUCA
1876	GAGUGAUG CUGAUGA X GAA AGUAAUCU	AGAUUACUC CAUCACUC
1880	UUCAGAGU CUGAUGA X GAA AUGGAGUA	UACUCCAUC ACUCUGAA
1884	AAGGUUCA CUGAUGA X GAA AGUGAUGG	CCAUCACUC UGAACCUU
1892	UUGAUGAC CUGAUGA X GAA AGGUUCAG	CUGAACCUU GUCAUCAA
1895	UUCUUGAU CUGAUGA X GAA ACAAGGUU	AACCUUGUC AUCAAGAA
1898	ACGUUCUU CUGAUGA X GAA AUGACAAG	CUUGUCAUC AAGAACGU
1909	CUUCUAGA CUGAUGA X GAA ACACGUUC	GAACGUGUC UCUAGAAG
1911	GUCUUCUA CUGAUGA X GAA AGACACGU	ACGUGUCUC UAGAAGAC
1913	GAGUCUUC CUGAUGA X GAA AGAGACAC	GUGUCUCUA GAAGACUC
1921	AGGUGCCC CUGAUGA X GAA AGUCUUCU	AGAAGACUC GGGCACCU
1930	UGCACGCA CUGAUGA X GAA AGGUGCCC	GGGCACCUA UGCGUGCA
1952	CCUGUGUA CUGAUGA X GAA AUGUUCCU	AGGAACAUA UACACAGG
1954	CCCCUGUG CUGAUGA X GAA AUAUGUUC	GAACAUAUA CACAGGGG
1970	UUCCGAAG CUGAUGA X GAA AUGUCUUC	GAAGACAUC CUUCGGAA
1973	GUCUUCCG CUGAUGA X GAA AGGAUGUC	GACAUCCUU CGGAAGAC
1974	UGUCUUCC CUGAUGA X GAA AAGGAUGU	ACAUCCUUC GGAAGACA
1988	CUAACGAG CUGAUGA X GAA ACUUCUGU	ACAGAAGUU CUCGUUAG
1989	UCUAACGA CUGAUGA X GAA AACUUCUG	CAGAAGUUC UCGUUAGA
1991	UCUCUAAC CUGAUGA X GAA AGAACUUC	GAAGUUCUC GUUAGAGA
1994	GAAUCUCU CUGAUGA X GAA ACGAGAAC	GUUCUCGUU AGAGAUUC
1995	CGAAUCUC CUGAUGA X GAA AACGAGAA	UUCUCGUUA GAGAUUCG
2001	CGCUUCCG CUGAUGA X GAA AUCUCUAA	UUAGAGAUU CGGAAGCG
2002	GCGCUUCC CUGAUGA X GAA AAUCUCUA	UAGAGAUUC GGAAGCGC
2021	AGGUUUUG CUGAUGA X GAA AGCAGGUG	CACCUGCUU CAAAACCU

2022	GAGGUUUU CUGAUGA X GAA AAGCAGGU	ACCUGCUUC AAAACCUC
2030	UAGUCACU CUGAUGA X GAA AGGUUUUG	CAAAACCUC AGUGACUA
2038	AGACCUCG CUGAUGA X GAA AGUCACUG	CAGUGACUA CGAGGUCU
2045	CUGAUGGA CUGAUGA X GAA ACCUCGUA	UACGAGGUC UCCAUCAG
2047	CACUGAUG CUGAUGA X GAA AGACCUCG	CGAGGUCUC CAUCAGUG
2051	GAGCCACU CUGAUGA X GAA AUGGAGAC	GUCUCCAUC AGUGGCUC
2059	AGGUCGUA CUGAUGA X GAA AGCCACUG	CAGUGGCUC UACGACCU
2061	UAAGGUCG CUGAUGA X GAA AGAGCCAC	GUGGCUCUA CGACCUUA
2068	GACAGUCU CUGAUGA X GAA AGGUCGUA	UACGACCUU AGACUGUC
2069	UGACAGUC CUGAUGA X GAA AAGGUCGU	ACGACCUUA GACUGUCA
2076	UCUAGCUU CUGAUGA X GAA ACAGUCUA	UAGACUGUC AAGCUAGA
2082	GACACCUC CUGAUGA X GAA AGCUUGAC	GUCAAGCUA GAGGUGUC
2090	GGCGCGGG CUGAUGA X GAA ACACCUCU	AGAGGUGUC CCCGCGCC
2100	AGUGAUCU CUGAUGA X GAA AGGCGCGG	CCGCGCCUC AGAUCACU
2105	AACCAAGU CUGAUGA X GAA AUCUGAGG	CCUCAGAUC ACUUGGUU
2109	UUUGAACC CUGAUGA X GAA AGUGAUCU	AGAUCACUU GGUUCAAA
2113	UGUUUUUG CUGAUGA X GAA ACCAAGUG	CACUUGGUU CAAAAACA
2114	UUGUUUUU CUGAUGA X GAA AACCAAGU	ACUUGGUUC AAAAACAA
2132	UCUUGUUG CUGAUGA X GAA AUUUUGUG	CACAAAAUA CAACAAGA
2150	CCUAAAAU CUGAUGA X GAA AUUCCCGG	CCGGGAAUU AUUUUAGG
2151	UCCUAAAA CUGAUGA X GAA AAUUCCCG	CGGGAAUUA UUUUAGGA
2153	GGUCCUAA CUGAUGA X GAA AUAAUUCC	GGAAUUAUU UUAGGACC
2154	UGGUCCUA CUGAUGA X GAA AAUAAUUC	GAAUUAUUU UAGGACCA
2155	CUGGUCCU CUGAUGA X GAA AAAUAAUU	AAUUAUUUU AGGACCAG
2156	CCUGGUCC CUGAUGA X GAA AAAAUAAU	AUUAUUUUA GGACCAGG
2179	UUUCAAUA CUGAUGA X GAA ACAGCGUG	CACGCUGUU UAUUGAAA
2180	CUUUCAAU CUGAUGA X GAA AACAGCGU	ACGCUGUUU AUUGAAAG
2181	UCUUUCAA CUGAUGA X GAA AAACAGCG	CGCUGUUUA UUGAAAGA
2183	ACUCUUUC CUGAUGA X GAA AUAAACAG	CUGUUUAUU GAAAGAGU
2192	UCCUCUGU CUGAUGA X GAA ACUCUUUC	GAAAGAGUC ACAGAGGA
2213	CACCUAUA CUGAUGA X GAA ACACCCUC	GAGGGUGUC UAUAGGUG
2215	GGCACCUA CUGAUGA X GAA AGACACCC	GGGUGUCUA UAGGUGCC
2217	UCGGCACC CUGAUGA X GAA AUAGACAC	GUGUCUAUA GGUGCCGA

2263	CGGUGAGG	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUA	CCUCACCG
2267	UGCACGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCGUGCA
2284	ACUUGUCU	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	AGACAAGU
2293	CCAGGUUU	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUC	AAACCUGG
2309	GUGAGCGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC	ACGCUCAC
2315	GUGCACGU	CUGAUGA	X	GAA	AGCGUGAU	AUCACGCUC	ACGUGCAC
2342	AGCCAAAA	CUGAUGA	X	GAA	AGGGUCGC	GCGACCCUC	UUUUGGCU
2344	GGAGCCAA	CUGAUGA	X	GAA	AGAGGGUC	GACCCUCUU	UUGGCUCC
2345	AGGAGCCA	CUGAUGA	X	GAA	AAGAGGGU	ACCCUCUUU	UGGCUCCU
2346	AAGGAGCC	CUGAUGA	X	GAA	AAAGAGGG	CCCUCUUUU	GGCUCCUU
2351	GUUAGAAG	CUGAUGA	X	GAA	AGCCAAAA	UUUUGGCUC	CUUCUAAC
2354	AGAGUUAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUU	CUAACUCU
2355	GAGAGUUA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCCUUC	UAACUCUC
2357	AAGAGAGU	CUGAUGA	X	GAA	AGAAGGAG	CUCCUUCUA	ACUCUCUU
2361	GAUGAAGA	CUGAUGA	X	GAA	AGUUAGAA	UUCUAACUC	UCUUCAUC
2363	CUGAUGAA	CUGAUGA	X	GAA	AGAGUUAG	CUAACUCUC	UUCAUCAG
2365	UUCUGAUG	CUGAUGA	X	GAA	AGAGAGUU	AACUCUCUU	CAUCAGAA
2366	UUUCUGAU	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC	AUCAGAAA
2369	AGUUUUCU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUC	AGAAAACU
2386	CGGAAGAA	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC	UUCUUCCG
2388	UUCGGAAG	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCUU	CUUCCGAA
2389	CUUCGGAA	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUC	UUCCGAAG
2391	UACUUCGG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU	CCGAAGUA
2392	UUACUUCG	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC	CGAAGUAA
2399	UCUGUCUU	CUGAUGA	X	GAA	ACUUCGGA	UCCGAAGUA	AAGACAGA
2410	UUGACAGG	CUGAUGA	X	GAA	AGUCUGUC	GACAGACUA	CCUGUCAA
2416	UAAUGAUU	CUGAUGA	X	GAA	ACAGGUAG	CUACCUGUC	AAUCAUUA
2420	UCCAUAAU	CUGAUGA	X	GAA	AUUGACAG	CUGUCAAUC	AUUAUGGA
2423	GGGUCCAU	CUGAUGA	X	GAA	AUGAUUGA	UCAAUCAUU	AUGGACCC
2424	UGGGUCCA	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUA	UGGACCCA
2441	UCCAGGGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU	CCCCUGGA
2442	AUCCAGGG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC	CCCUGGAU
2473	UGGCAUCA	CUGAUGA	X	GAA	AGGGCAGC	GCUGCCCUA	UGAUGCCA

2494	CCCGUGCA CUGAUGA X GAA ACUCCCAC	GUGGGAGUU UGCACGGG
2495	UCCCGUGC CUGAUGA X GAA AACUCCCA	UGGGAGUUU GCACGGGA
2516	GAUUUGCC CUGAUGA X GAA AGUUUCAG	CUGAAACUA GGCAAAUC
2524	UUCCGAGC CUGAUGA X GAA AUUUGCCU	AGGCAAAUC GCUCGGAA
2528	CCUCUUCC CUGAUGA X GAA AGCGAUUU	AAAUCGCUC GGAAGAGG
2541	UUUCCCAA CUGAUGA X GAA AGCCCCUC	GAGGGGCUU UUGGGAAA
2542	CUUUCCCA CUGAUGA X GAA AAGCCCCU	AGGGGCUUU UGGGAAAG
2543	ACUUUCCC CUGAUGA X GAA AAAGCCCC	GGGGCUUUU GGGAAAGU
2552	GCUUGAAC CUGAUGA X GAA ACUUUCCC	GGGAAAGUC GUUCAAGC
2555	GAGGCUUG CUGAUGA X GAA ACGACUUU	AAAGUCGUU CAAGCCUC
2556	AGAGGCUU CUGAUGA X GAA AACGACUU	AAGUCGUUC AAGCCUCU
2563	CAAAUGCA CUGAUGA X GAA AGGCUUGA	UCAAGCCUC UGCAUUUG
2569	UAAUGCCA CUGAUGA X GAA AUGCAGAG	CUCUGCAUU UGGCAUUA
2570	UUAAUGCC CUGAUGA X GAA AAUGCAGA	UCUGCAUUU GGCAUUAA
2576	GAUUUCUU CUGAUGA X GAA AUGCCAAA	UUUGGCAUU AAGAAAUC
2577	UGAUUUCU CUGAUGA X GAA AAUGCCAA	UUGGCAUUA AGAAAUCA
2584	AGGUGGGU CUGAUGA X GAA AUUUCUUA	UAAGAAAUC ACCCACCU
2617	CCUCUUUC CUGAUGA X GAA ACAUCUUC	GAAGAUGUU GAAAGAGG
2644	GAGCUUUG CUGAUGA X GAA ACUCACUG	CAGUGAGUA CAAAGCUC
2652	GGUCAUCA CUGAUGA X GAA AGCUUUGU	ACAAAGCUC UGAUGACC
2666	AAGAUCUU CUGAUGA X GAA AGUUCGGU	ACCGAACUC AAGAUCUU
2672	UGGGUCAA CUGAUGA X GAA AUCUUGAG	CUCAAGAUC UUGACCCA
2674	UGUGGGUC CUGAUGA X GAA AGAUCUUG	CAAGAUCUU GACCCACA
2684	UGAUGGCC CUGAUGA X GAA AUGUGGGU	ACCCACAUC GGCCAUCA
2691	AUUCAGAU CUGAUGA X GAA AUGGCCGA	UCGGCCAUC AUCUGAAU
2694	CACAUUCA CUGAUGA X GAA AUGAUGGC	GCCAUCAUC UGAAUGUG
2705	AGGAGGUU CUGAUGA X GAA ACCACAUU	AAUGUGGUU AACCUCCU
2706	CAGGAGGU CUGAUGA X GAA AACCACAU	AUGUGGUUA ACCUCCUG
2711	GCUCCCAG CUGAUGA X GAA AGGUUAAC	GUUAACCUC CUGGGAGC
2742	CACCAUCA CUGAUGA X GAA AGGCCCUC	GAGGGCCUC UGAUGGUG
2753	UAUUCCAC CUGAUGA X GAA AUCACCAU	AUGGUGAUC GUGGAAUA
2761	AUUUGCAG CUGAUGA X GAA AUUCCACG	CGUGGAAUA CUGCAAAU
2770	GGUUUCCG CUGAUGA X GAA AUUUGCAG	CUGCAAAUA CGGAAACC

2782	GGUAGUUG CUGAUGA X GAA ACAGGUUU	AAACCUGUC CAACUACC
2788	UCUUGAGG CUGAUGA X GAA AGUUGGAC	GUCCAACUA CCUCAAGA
2792	UUGCUCUU CUGAUGA X GAA AGGUAGUU	AACUACCUC AAGAGCAA
2809	GACAGAAU CUGAUGA X GAA AGUCACGU	ACGUGACUU AUUCUGUC
2810	AGACAGAA CUGAUGA X GAA AAGUCACG	CGUGACUUA UUCUGUCU
2812	UGAGACAG CUGAUGA X GAA AUAAGUCA	UGACUUAUU CUGUCUCA
2813	UUGAGACA CUGAUGA X GAA AAUAAGUC	GACUUAUUC UGUCUCAA
2817	CUUGUUGA CUGAUGA X GAA ACAGAAUA	UAUUCUGUC UCAACAAG
2819	UCCUUGUU CUGAUGA X GAA AGACAGAA	UUCUGUCUC AACAAGGA
2836	CCAUAUGC CUGAUGA X GAA AGGCUGCG	CGCAGCCUU GCAUAUGG
2841	GAGCUCCA CUGAUGA X GAA AUGCAAGG	CCUUGCAUA UGGAGCUC
2849	UCUUUCUU CUGAUGA X GAA AGCUCCAU	AUGGAGCUC AAGAAAGA
2900	ACACUGUC CUGAUGA X GAA AGGCGGGG	CCCCGCCUA GACAGUGU
2909	GAGCUGCU CUGAUGA X GAA ACACUGUC	GACAGUGUC AGCAGCUC
2917	UGACACUU CUGAUGA X GAA AGCUGCUG	CAGCAGCUC AAGUGUCA
2924	GAGCUGGU CUGAUGA X GAA ACACUUGA	UCAAGUGUC ACCAGCUC
2932	GGAAGCUG CUGAUGA X GAA AGCUGGUG	CACCAGCUC CAGCUUCC
2938	CUUCAGGG CUGAUGA X GAA AGCUGGAG	CUCCAGCUU CCCUGAAG
2939	UCUUCAGG CUGAUGA X GAA AAGCUGGA	UCCAGCUUC CCUGAAGA
2982	CUCACUGU CUGAUGA X GAA AUCCUCGU	ACGAGGAUU ACAGUGAG
2983	UCUCACUG CUGAUGA X GAA AAUCCUCG	CGAGGAUUA CAGUGAGA
2993	UGCUUGGA CUGAUGA X GAA AUCUCACU	AGUGAGAUC UCCAAGCA
2995	GCUGCUUG CUGAUGA X GAA AGAUCUCA	UGAGAUCUC CAAGCAGC
3008	UCCAUGGU CUGAUGA X GAA AGGGGCUG	CAGCCCCUC ACCAUGGA
3026	CUGUAGGA CUGAUGA X GAA AUCAGGUC	GACCUGAUU UCCUACAG
3027	ACUGUAGG CUGAUGA X GAA AAUCAGGU	ACCUGAUUU CCUACAGU
3028	AACUGUAG CUGAUGA X GAA AAAUCAGG	CCUGAUUUC CUACAGUU
3031	GGAAACUG CUGAUGA X GAA AGGAAAUC	GAUUUCCUA CAGUUUCC
3036	CACUUGGA CUGAUGA X GAA ACUGUAGG	CCUACAGUU UCCAAGUG
3037	CCACUUGG CUGAUGA X GAA AACUGUAG	CUACAGUUU CCAAGUGG
3038	GCCACUUG CUGAUGA X GAA AAACUGUA	UACAGUUUC CAAGUGGC
3061	AGGACAGA CUGAUGA X GAA ACUCCAUG	CAUGGAGUU UCUGUCCU
3062	GAGGACAG CUGAUGA X GAA AACUCCAU	AUGGAGUUU CUGUCCUC

3063	GGAGGACA CUGAUGA X GAA AAACUCCA	UGGAGUUUC UGUCCUCC
3067	UUCUGGAG CUGAUGA X GAA ACAGAAAC	GUUUCUGUC CUCCAGAA
3070	ACUUUCUG CUGAUGA X GAA AGGACAGA	UCUGUCCUC CAGAAAGU
3083	UCCCGAUG CUGAUGA X GAA AUGCACUU	AAGUGCAUU CAUCGGGA
3084	GUCCCGAU CUGAUGA X GAA AAUGCACU	AGUGCAUUC AUCGGGAC
3087	CAGGUCCC CUGAUGA X GAA AUGAAUGC	GCAUUCAUC GGGACCUG
3110	GAUAAAAG CUGAUGA X GAA AUGUUUCU	AGAAACAUC CUUUUAUC
3113	UCAGAUAA CUGAUGA X GAA AGGAUGUU	AACAUCCUU UUAUCUGA
3114	CUCAGAUA CUGAUGA X GAA AAGGAUGU	ACAUCCUUU UAUCUGAG
3115	UCUCAGAU CUGAUGA X GAA AAAGGAUG	CAUCCUUUU AUCUGAGA
3116	UUCUCAGA CUGAUGA X GAA AAAAGGAU	AUCCUUUUA UCUGAGAA
3118	UGUUCUCA CUGAUGA X GAA AUAAAAGG	CCUUUUAUC UGAGAACA
3140	AAGUCGCA CUGAUGA X GAA AUCUUCAC	GUGAAGAUU UGCGACUU
3141	AAAGUCGC CUGAUGA X GAA AAUCUUCA	UGAAGAUUU GCGACUUU
3148	CCAGGCCA CUGAUGA X GAA AGUCGCAA	UUGCGACUU UGGCCUGG
3149	GCCAGGCC CUGAUGA X GAA AAGUCGCA	UGCGACUUU GGCCUGGC
3165	CUUAUAAA CUGAUGA X GAA AUCCCGGG	CCCGGGAUA UUUAUAAG
3167	UUCUUAUA CUGAUGA X GAA AUAUCCCG	CGGGAUAUU UAUAAGAA
3168	GUUCUUAU CUGAUGA X GAA AAUAUCCC	GGGAUAUUU AUAAGAAC
3169	GGUUCUUA CUGAUGA X GAA AAAUAUCC	GGAUAUUUA UAAGAACC
3171	AGGGUUCU CUGAUGA X GAA AUAAAUAU	AUAUUUAUA AGAACCCU
3183	CCUCACAU CUGAUGA X GAA AUCAGGGU	ACCCUGAUU AUGUGAGG
3184	UCCUCACA CUGAUGA X GAA AAUCAGGG	CCCUGAUUA UGUGAGGA
3201	AAGUCGAG CUGAUGA X GAA AUCUCCUC	GAGGAGAUA CUCGACUU
3204	GGGAAGUC CUGAUGA X GAA AGUAUCUC	GAGAUACUC GACUUCCC
3209	UUUAGGGG CUGAUGA X GAA AGUCGAGU	ACUCGACUU CCCCUAAA
3210	UUUUAGGG CUGAUGA X GAA AAGUCGAG	CUCGACUUC CCCUAAAA
3215	AUCCAUUU CUGAUGA X GAA AGGGGAAG	CUUCCCCUA AAAUGGAU
3228	GGAUUCAG CUGAUGA X GAA AGCCAUCC	GGAUGGCUC CUGAAUCC
3235	CAAAGAUG CUGAUGA X GAA AUUCAGGA	UCCUGAAUC CAUCUUUG
3239	UUGUCAAA CUGAUGA X GAA AUGGAUUC	GAAUCCAUC UUUGACAA
3241	CCUUGUCA CUGAUGA X GAA AGAUGGAU	AUCCAUCUU UGACAAGG
3242	ACCUUGUC CUGAUGA X GAA AAGAUGGA	UCCAUCUUU GACAAGGU

3251	GUGCUGUA CUGAUGA X GAA ACCUUGUC	GACAAGGUC UACAGCAC
3253	UGGUGCUG CUGAUGA X GAA AGACCUUG	CAAGGUCUA CAGCACCA
3277	CGCCAUAG CUGAUGA X GAA ACCACACA	UGUGUGGUC CUAUGGCG
3280	ACACGCCA CUGAUGA X GAA AGGACCAC	GUGGUCCUA UGGCGUGU
3289	CCCACAGC CUGAUGA X GAA ACACGCCA	UGGCGUGUU GCUGUGGG
3302	AAGGAGAA CUGAUGA X GAA AUCUCCCA	UGGGAGAUC UUCUCCUU
3304	CUAAGGAG CUGAUGA X GAA AGAUCUCC	GGAGAUCUU CUCCUUAG
3305	CCUAAGGA CUGAUGA X GAA AAGAUCUC	GAGAUCUUC UCCUUAGG
3307	CCCCUAAG CUGAUGA X GAA AGAAGAUC	GAUCUUCUC CUUAGGGG
3310	AACCCCCU CUGAUGA X GAA AGGAGAAG	CUUCUCCUU AGGGGGUU
3311	GAACCCCC CUGAUGA X GAA AAGGAGAA	UUCUCCUUA GGGGGUUC
3318	GUAUGGAG CUGAUGA X GAA ACCCCCUA	UAGGGGGUU CUCCAUAC
3319	GGUAUGGA CUGAUGA X GAA AACCCCCU	AGGGGGUUC UCCAUACC
3321	UGGGUAUG CUGAUGA X GAA AGAACCCC	GGGGUUCUC CAUACCCA
3325	CUCCUGGG CUGAUGA X GAA AUGGAGAA	UUCUCCAUA CCCAGGAG
3352	GGCUGCAG CUGAUGA X GAA AGUCUUCA	UGAAGACUU CUGCAGCC
3353	CGGCUGCA CUGAUGA X GAA AAGUCUUC	GAAGACUUC UGCAGCCG
3397	GUGUGGCA CUGAUGA X GAA ACUCCGGG	CCCGGAGUA UGCCACAC
3413	AUUUGGUA CUGAUGA X GAA AUUUCAGG	CCUGAAAUC UACCAAAU
3415	UGAUUUGG CUGAUGA X GAA AGAUUUCA	UGAAAUCUA CCAAAUCA
3422	UCCAACAU CUGAUGA X GAA AUUUGGUA	UACCAAAUC AUGUUGGA
3427	AGCAAUCC CUGAUGA X GAA ACAUGAUU	AAUCAUGUU GGAUUGCU
3432	GUGCCAGC CUGAUGA X GAA AUCCAACA	UGUUGGAUU GCUGGCAC
3466	GUUCAGCA CUGAUGA X GAA ACCGGGGC	GCCCCGGUU UGCUGAAC
3467	AGUUCAGC CUGAUGA X GAA AACCGGGG	CCCCGGUUU GCUGAACU
3476	UUCUCCAC CUGAUGA X GAA AGUUCAGC	GCUGAACUU GUGGAGAA
3488	AGGUCACC CUGAUGA X GAA AGUUUCUC	GAGAAACUU GGUGACCU
3500	UUGGCUUG CUGAUGA X GAA AGCAGGUC	GACCUGCUU CAAGCCAA
3501	GUUGGCUU CUGAUGA X GAA AAGCAGGU	ACCUGCUUC AAGCCAAC
3512	UCCUGUUG CUGAUGA X GAA ACGUUGGC	GCCAACGUC CAACAGGA
3531	GGGGAUGU CUGAUGA X GAA AUCUUUCC	GGAAAGAUU ACAUCCCC
3532	GGGGGAUG CUGAUGA X GAA AAUCUUUC	GAAAGAUUA CAUCCCCC
3536	UUGAGGGG CUGAUGA X GAA AUGUAAUC	GAUUACAUC CCCCUCAA

3542	AUGGCAUU	CUGAUGA	X	GAA	AGGGGGAU	AUCCCCCUC AAUGCCAU
3551	CUAGUCAG	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAUA CUGACUAG
3558	ACUGUUUC	CUGAUGA	X	GAA	AGUCAGUA	UACUGACUA GAAACAGU
3567	UGUGAAGC	CUGAUGA	X	GAA	ACUGUUUC	GAAACAGUA GCUUCACA
3571	AGUAUGUG	CUGAUGA	X	GAA	AGCUACUG	CAGUAGCUU CACAUACU
3572	GAGUAUGU	CUGAUGA	X	GAA	AAGCUACU	AGUAGCUUC ACAUACUC
3577	GGGUCGAG	CUGAUGA	X	GAA	AUGUGAAG	CUUCACAUA CUCGACCC
3580	UGGGGGUC	CUGAUGA	X	GAA	AGUAUGUG	CACAUACUC GACCCCCA
3592	CCUCAGAG	CUGAUGA	X	GAA	AGGUGGGG	CCCCACCUU CUCUGAGG
3593	UCCUCAGA	CUGAUGA	X	GAA	AAGGUGGG	CCCACCUUC UCUGAGGA
3595	GGUCCUCA	CUGAUGA	X	GAA	AGAAGGUG	CACCUUCUC UGAGGACC
3605	UCCUUGAA	CUGAUGA	X	GAA	AGGUCCUC	GAGGACCUU UUCAAGGA
3606	GUCCUUGA	CUGAUGA	X	GAA	AAGGUCCU	AGGACCUUU UCAAGGAC
3607	CGUCCUUG	CUGAUGA	X	GAA	AAAGGUCC	GGACCUUUU CAAGGACG
3608	CCGUCCUU	CUGAUGA	X	GAA	AAAAGGUC	GACCUUUUC AAGGACGG
3619	GAUCUGCA	CUGAUGA	X	GAA	AGCCGUCC	GGACGGCUU UGCAGAUC
3620	GGAUCUGC	CUGAUGA	X	GAA	AAGCCGUC	GACGGCUUU GCAGAUCC
3627	AAAAUGUG	CUGAUGA	X	GAA	AUCUGCAA	UUGCAGAUC CACAUUUU
3633	GGAAUGAA	CUGAUGA	X	GAA	AUGUGGAU	AUCCACAUU UUCAUUCC
3634	CGGAAUGA	CUGAUGA	X	GAA	AAUGUGGA	UCCACAUUU UCAUUCCG
3635	CCGGAAUG	CUGAUGA	X	GAA	AAAUGUGG	CCACAUUUU CAUUCCGG
3636	UCCGGAAU	CUGAUGA	X	GAA	AAAAUGUG	CACAUUUUC AUUCCGGA
3639	GCUUCCGG	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUU CCGGAAGC
3640	AGCUUCCG	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUC CGGAAGCU
3649	CAUCAUCA	CUGAUGA	X	GAA	AGCUUCCG	CGGAAGCUC UGAUGAUG
3664	CGUUUACA	CUGAUGA	X	GAA	AUCUCACA	UGUGAGAUA UGUAAACG
3668	AAAGCGUU	CUGAUGA	X	GAA	ACAUAUCU	AGAUAUGUA AACGCUUU
3675	GAAUUUGA	CUGAUGA	X	GAA	AGCGUUUA	UAAACGCUU UCAAAUUC
3676	UGAAUUUG	CUGAUGA	X	GAA	AAGCGUUU	AAACGCUUU CAAAUUCA
3677	AUGAAUUU	CUGAUGA	X	GAA	AAAGCGUU	AACGCUUUC AAAUUCAU
3682	GGCUCAUG	CUGAUGA	X	GAA	AUUUGAAA	UUUCAAAUU CAUGAGCC
3683	AGGCUCAU	CUGAUGA	X	GAA	AAUUUGAA	UUCAAAUUC AUGAGCCU
3701	AAGGUUUU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUC AAAACCUU

3709	GCUCCUCA	CUGAUGA	X	GAA	AGGUUUUG	CAAAACCUU	UGAGGAGC
3710	AGCUCCUC	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	GAGGAGCU
3719	UUCGGUGA	CUGAUGA	X	GAA	AGCUCCUC	GAGGAGCUU	UCACCGAA
3720	GUUCGGUG	CUGAUGA	X	GAA	AAGCUCCU	AGGAGCUUU	CACCGAAC
3721	AGUUCGGU	CUGAUGA	X	GAA	AAAGCUCC	GGAGCUUUC	ACCGAACU
3730	UGGAGGUG	CUGAUGA	X	GAA	AGUUCGGU	ACCGAACUC	CACCUCCA
3736	CAAACAUG	CUGAUGA	X	GAA	AGGUGGAG	CUCCACCUC	CAUGUUUG
3742	AGUCCUCA	CUGAUGA	X	GAA	ACAUGGAG	CUCCAUGUU	UGAGGACU
3743	UAGUCCUC	CUGAUGA	X	GAA	AACAUGGA	UCCAUGUUU	GAGGACUA
3751	CCAGCUGA	CUGAUGA	X	GAA	AGUCCUCA	UGAGGACUA	UCAGCUGG
3753	GUCCAGCU	CUGAUGA	X	GAA	AUAGUCCU	AGGACUAUC	AGCUGGAC
3765	CAGAGUGC	CUGAUGA	X	GAA	AGUGUCCA	UGGACACUA	GCACUCUG
3771	GCCCAGCA	CUGAUGA	X	GAA	AGUGCUAG	CUAGCACUC	UGCUGGGC
3781	GCAAGGGG	CUGAUGA	X	GAA	AGCCCAGC	GCUGGGCUC	CCCCUUGC
3787	GCUUCAGC	CUGAUGA	X	GAA	AGGGGGAG	CUCCCCCUU	GCUGAAGC
3799	UCCAGGUG	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUU	CACCUGGA
3800	GUCCAGGU	CUGAUGA	X	GAA	AACCGCUU	AAGCGGUUC	ACCUGGAC
3829	UCUUCAUG	CUGAUGA	X	GAA	AGGCCUUG	CAAGGCCUC	CAUGAAGA
3839	CUCAAGUC	CUGAUGA	X	GAA	AUCUUCAU	AUGAAGAUA	GACUUGAG
3844	CUAUUCUC	CUGAUGA	X	GAA	AGUCUAUC	GAUAGACUU	GAGAAUAG
3851	UUACUCGC	CUGAUGA	X	GAA	AUUCUCAA	UUGAGAAUA	GCGAGUAA
3858	CUUGCUUU	CUGAUGA	X	GAA	ACUCGCUA	UAGCGAGUA	AAAGCAAG
3878	AGAUCGGA	CUGAUGA	X	GAA	AGUCCCGC	GCGGGACUU	UCCGAUCU
3879	CAGAUCGG	CUGAUGA	X	GAA	AAGUCCCG	CGGGACUUU	CCGAUCUG
3880	GCAGAUCG	CUGAUGA	X	GAA	AAAGUCCC	GGGACUUUC	CGAUCUGC
3885	CCUCGGCA	CUGAUGA	X	GAA	AUCGGAAA	UUUCCGAUC	UGCCGAGG
3901	AGAAGCAG	CUGAUGA	X	GAA	AGCUGGGC	GCCCAGCUU	CUGCUUCU
3902	GAGAAGCA	CUGAUGA	X	GAA	AAGCUGGG	CCCAGCUUC	UGCUUCUC
3907	AGCUGGAG	CUGAUGA	X	GAA	AGCAGAAG	CUUCUGCUU	CUCCAGCU
3908	CAGCUGGA	CUGAUGA	X	GAA	AAGCAGAA	UUCUGCUUC	UCCAGCUG
3910	CACAGCUG	CUGAUGA	X	GAA	AGAAGCAG	CUGCUUCUC	CAGCUGUG
3926	ACGGGCCU	CUGAUGA	X	GAA	AUGUGGCC	GGCCACAUC	AGGCCCGU
3949	CCAGCUCA	CUGAUGA	X	GAA	AUUCAUCG	CGAUGAAUC	UGAGCUGG

3967	AACAGCAG CUGAUGA X GAA ACUCCUUU	AAAGGAGUC CUGCUGUU
3975	GGGUGGAG CUGAUGA X GAA ACAGCAGG	CCUGCUGUU CUCCACCC
3976	GGGGUGGA CUGAUGA X GAA AACAGCAG	CUGCUGUUC UCCACCCC
3978	UGGGGGUG CUGAUGA X GAA AGAACAGC	GCUGUUCUC CACCCCCA
3991	CGGAGUUG CUGAUGA X GAA AGUCUGGG	CCCAGACUA CAACUCCG
3997	ACACCACG CUGAUGA X GAA AGUUGUAG	CUACAACUC CGUGGUGU
4006	AGGAGUAC CUGAUGA X GAA ACACCACG	CGUGGUGUU GUACUCCU
4009	GGGAGGAG CUGAUGA X GAA ACAACACC	GGUGUUGUA CUCCUCCC
4012	GCGGGGAG CUGAUGA X GAA AGUACAAC	GUUGUACUC CUCCCCGC
4015	CGGGCGGG CUGAUGA X GAA AGGAGUAC	GUACUCCUC CCCGCCCG
4027	AGAAGCUU CUGAUGA X GAA AGGCGGGC	GCCCGCCUA AAGCUUCU
4033	CUGGUGAG CUGAUGA X GAA AGCUUUAG	CUAAAGCUU CUCACCAG
4034	GCUGGUGA CUGAUGA X GAA AAGCUUUA	UAAAGCUUC UCACCAGC
4036	GGGCUGGU CUGAUGA X GAA AGAAGCUU	AAGCUUCUC ACCAGCCC
4066	AUGUAUAA CUGAUGA X GAA ACUGUCAG	CUGACAGUA UUAUACAU
4068	AGAUGUAU CUGAUGA X GAA AUACUGUC	GACAGUAUU AUACAUCU
4069	UAGAUGUA CUGAUGA X GAA AAUACUGU	ACAGUAUUA UACAUCUA
4071	CAUAGAUG CUGAUGA X GAA AUAAUACU	AGUAUUAUA CAUCUAUG
4075	AACUCAUA CUGAUGA X GAA AUGUAUAA	UUAUACAUC UAUGAGUU
4077	UAAACUCA CUGAUGA X GAA AGAUGUAU	AUACAUCUA UGAGUUUA
4083	UAGGUGUA CUGAUGA X GAA ACUCAUAG	CUAUGAGUU UACACCUA
4084	AUAGGUGU CUGAUGA X GAA AACUCAUA	UAUGAGUUU ACACCUAU
4085	AAUAGGUG CUGAUGA X GAA AAACUCAU	AUGAGUUUA CACCUAUU
4091	GAGCGGAA CUGAUGA X GAA AGGUGUAA	UUACACCUA UUCCGCUC
4093	UGGAGCGG CUGAUGA X GAA AUAGGUGU	ACACCUAUU CCGCUCCA
4094	GUGGAGCG CUGAUGA X GAA AAUAGGUG	CACCUAUUC CGCUCCAC
4099	CUCCUGUG CUGAUGA X GAA AGCGGAAU	AUUCCGCUC CACAGGAG
4117	GUCACGAA CUGAUGA X GAA AGCAGCUG	CAGCUGCUU UUCGUGAC
4118	GGUCACGA CUGAUGA X GAA AAGCAGCU	AGCUGCUUU UCGUGACC
4119	AGGUCACG CUGAUGA X GAA AAAGCAGC	GCUGCUUUU CGUGACCU
4120	AAGGUCAC CUGAUGA X GAA AAAAGCAG	CUGCUUUUC GUGACCUU
4128	CACGAUUA CUGAUGA X GAA AGGUCACG	CGUGACCUU UAAUCGUG
4129	GCACGAUU CUGAUGA X GAA AAGGUCAC	GUGACCUUU AAUCGUGC

4130	AGCACGAU	CUGAUGA	X	GAA	AAAGGUCA	UGACCUUUA	AUCGUGCU
4133	AAAAGCAC	CUGAUGA	X	GAA	AUUAAAGG	CCUUUAAUC	GUGCUUUU
4139	AAACAAAA	CUGAUGA	X	GAA	AGCACGAU	AUCGUGCUU	UUUUGUUU
4140	AAAACAAA	CUGAUGA	X	GAA	AAGCACGA	UCGUGCUUU	UUUGUUUU
4141	AAAAACAA	CUGAUGA	X	GAA	AAAGCACG	CGUGCUUUU	UUGUUUUU
4142	AAAAAACA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UGUUUUUU
4143	CAAAAAAC	CUGAUGA	X	GAA	AAAAAGCA	UGCUUUUUU	GUUUUUUG
4146	AAACAAAA	CUGAUGA	X	GAA	ACAAAAAA	UUUUUUGUU	UUUUGUUU
4147	AAAACAAA	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	UUUGUUUU
4148	CAAAACAA	CUGAUGA	X	GAA	AAACAAAA	UUUUGUUUU	UUGUUUUG
4149	ACAAAACA	CUGAUGA	X	GAA	AAAACAAA	UUUGUUUUU	UGUUUUGU
4150	AACAAAAC	CUGAUGA	X	GAA	AAAAACAA	UUGUUUUUU	GUUUUGUU
4153	ACAAACAA	CUGAUGA	X	GAA	ACAAAAAA	UUUUUUGUU	UUGUUUGU
4154	AACAAACA	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	UGUUUGUU
4155	CAACAAAC	CUGAUGA	X	GAA	AAACAAAA	UUUUGUUUU	GUUUGUUG
4158	CAACAACA	CUGAUGA	X	GAA	ACAAAACA	UGUUUUGUU	UGUUGUUG
4159	GCAACAAC	CUGAUGA	X	GAA	AACAAAAC	GUUUUGUUU	GUUGUUGC
4162	ACAGCAAC	CUGAUGA	X	GAA	ACAAACAA	UUGUUUGUU	GUUGCUGU
4165	AAAACAGC	CUGAUGA	X	GAA	ACAACAAA	UUUGUUGUU	GCUGUUUU
4171	UUAGUCAA	CUGAUGA	X	GAA	ACAGCAAC	GUUGCUGUU	UUGACUAA
4172	GUUAGUCA	CUGAUGA	X	GAA	AACAGCAA	UUGCUGUUU	UGACUAAC
4173	UGUUAGUC	CUGAUGA	X	GAA	AAACAGCA	UGCUGUUUU	GACUAACA
4178	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUGACUA	ACAAGAAU
4189	ACUGGGGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACCCCAGU
4198	ACGUCACU	CUGAUGA	X	GAA	ACUGGGGU	ACCCCAGUU	AGUGACGU
4199	CACGUCAC	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	GUGACGUG
4216	AACAAUAG	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUA	CUAUUGUU
4219	UCUAACAA	CUGAUGA	X	GAA	AGUAUUCU	AGAAUACUA	UUGUUAGA
4221	UCUCUAAC	CUGAUGA	X	GAA	AUAGUAUU	AAUACUAUU	GUUAGAGA
4224	AUUUCUCU	CUGAUGA	X	GAA	ACAAUAGU	ACUAUUGUU	AGAGAAAU
4225	GAUUUCUC	CUGAUGA	X	GAA	AACAAUAG	CUAUUGUUA	GAGAAAUC
4233	GCGGGGGG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUC	CCCCCCGC
4249	GUUACCCU	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUC	AGGGUAAC

4255	GUCCAGGU	CUGAUGA	X	GAA	ACCCUGAG	CUCAGGGUA	ACCUGGAC
4282	GGUCGCCA	CUGAUGA	X	GAA	AGGCACCU	AGGUGCCUC	UGGCGACC
4323	GCUGCAGG	CUGAUGA	X	GAA	AGGGUGGG	CCCACCCUC	CCUGCAGC
4341	ACUGCCUC	CUGAUGA	X	GAA	AGUCCCAC	GUGGGACUA	GAGGCAGU
4350	AAUGGGCU	CUGAUGA	X	GAA	ACUGCCUC	GAGGCAGUA	AGCCCAUU
4358	CAUGAGCU	CUGAUGA	X	GAA	AUGGGCUU	AAGCCCAUU	AGCUCAUG
4359	CCAUGAGC	CUGAUGA	X	GAA	AAUGGGCU	AGCCCAUUA	GCUCAUGG
4363	GCAGCCAU	CUGAUGA	X	GAA	AGCUAAUG	CAUUAGCUC	AUGGCUGC
4387	GAGAGACA	CUGAUGA	X	GAA	AGCAGGUC	GACCUGCUC	UGUCUCUC
4391	AUAAGAGA	CUGAUGA	X	GAA	ACAGAGCA	UGCUCUGUC	UCUCUUAU
4393	CCAUAAGA	CUGAUGA	X	GAA	AGACAGAG	CUCUGUCUC	UCUUAUGG
4395	CUCCAUAA	CUGAUGA	X	GAA	AGAGACAG	CUGUCUCUC	UUAUGGAG
4397	UCCUCCAU	CUGAUGA	X	GAA	AGAGAGAC	GUCUCUCUU	AUGGAGGA
4398	UUCCUCCA	CUGAUGA	X	GAA	AAGAGAGA	UCUCUCUUA	UGGAGGAA
4445	GCAUCCCA	CUGAUGA	X	GAA	AGCCUUUU	AAAAGGCUU	UGGGAUGC
4446	CGCAUCCC	CUGAUGA	X	GAA	AAGCCUUU	AAAGGCUUU	GGGAUGCG
4456	ACAGGACG	CUGAUGA	X	GAA	ACGCAUCC	GGAUGCGUC	CGUCCUGU
4460	CUCCACAG	CUGAUGA	X	GAA	ACGGACGC	GCGUCCGUC	CUGUGGAG
4487	GCAUAGCG	CUGAUGA	X	GAA	AGCCCCCU	AGGGGGCUC	CGCUAUGC
4492	AAGUGGCA	CUGAUGA	X	GAA	AGCGGAGC	GCUCCGCUA	UGCCACUU
4500	AGUCACUG	CUGAUGA	X	GAA	AGUGGCAU	AUGCCACUU	CAGUGACU
4501	AAGUCACU	CUGAUGA	X	GAA	AAGUGGCA	UGCCACUUC	AGUGACUU
4509	GGAGUGAG	CUGAUGA	X	GAA	AGUCACUG	CAGUGACUU	CUCACUCC
4510	AGGAGUGA	CUGAUGA	X	GAA	AAGUCACU	AGUGACUUC	UCACUCCU
4512	CCAGGAGU	CUGAUGA	X	GAA	AGAAGUCA	UGACUUCUC	ACUCCUGG
4516	GAGGCCAG	CUGAUGA	X	GAA	AGUGAGAA	UUCUCACUC	CUGGCCUC
4524	AAACAGCG	CUGAUGA	X	GAA	AGGCCAGG	CCUGGCCUC	CGCUGUUU
4531	GGGCCCGA	CUGAUGA	X	GAA	ACAGCGGA	UCCGCUGUU	UCGGGCCC
4532	GGGGCCCG	CUGAUGA	X	GAA	AACAGCGG	CCGCUGUUU	CGGGCCCC
4533	GGGGGCCC	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUC	GGGCCCCC
4543	CCUCUUGG	CUGAUGA	X	GAA	AGGGGGCC	GGCCCCCUU	CCAAGAGG
4544	ACCUCUUG	CUGAUGA	X	GAA	AAGGGGGC	GCCCCCUUC	CAAGAGGU
4553	UGCUCUGA	CUGAUGA	X	GAA	ACCUCUUG	CAAGAGGUA	UCAGAGCA

4555	UCUGCUCU	CUGAUGA	X	GAA	AUACCUCU	AGAGGUAUC	AGAGCAGA
4577	GUCUAGGA	CUGAUGA	X	GAA	ACGUCCCU	AGGGACGUU	UCCUAGAC
4578	GGUCUAGG	CUGAUGA	X	GAA	AACGUCCC	GGGACGUUU	CCUAGACC
4579	UGGUCUAG	CUGAUGA	X	GAA	AAACGUCC	GGACGUUUC	CUAGACCA
4582	CCCUGGUC	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	GACCAGGG
4598	UUCCCGAG	CUGAUGA	X	GAA	ACAUGUGC	GCACAUGUU	CUCGGGAA
4599	GUUCCCGA	CUGAUGA	X	GAA	AACAUGUG	CACAUGUUC	UCGGGAAC
4601	UGGUUCCC	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	GGGAACCA
4614	UUAAGAUU	CUGAUGA	X	GAA	ACUGUGGU	ACCACAGUU	AAUCUUAA
4615	UUUAAGAU	CUGAUGA	X	GAA	AACUGUGG	CCACAGUUA	AUCUUAAA
4618	AGAUUUAA	CUGAUGA	X	GAA	AUUAACUG	CAGUUAAUC	UUAAAUCU
4620	AAAGAUUU	CUGAUGA	X	GAA	AGAUUAAC	GUUAAUCUU	AAAUCUUU
4621	AAAAGAUU	CUGAUGA	X	GAA	AAGAUUAA	UUAAUCUUA	AAUCUUUU
4625	CGGGAAAA	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUC	UUUUCCCG
4627	CCCGGGAA	CUGAUGA	X	GAA	AGAUUUAA	UUAAAUCUU	UUCCCGGG
4628	UCCCGGGA	CUGAUGA	X	GAA	AAGAUUUA	UAAAUCUUU	UCCCGGGA
4629	CUCCCGGG	CUGAUGA	X	GAA	AAAGAUUU	AAAUCUUUU	CCCGGGAG
4630	ACUCCCGG	CUGAUGA	X	GAA	AAAAGAUU	AAUCUUUUC	CCGGGAGU
4639	CAACAGAA	CUGAUGA	X	GAA	ACUCCCGG	CCGGGAGUC	UUCUGUUG
4641	GACAACAG	CUGAUGA	X	GAA	AGACUCCC	GGGAGUCUU	CUGUUGUC
4642	AGACAACA	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUC	UGUUGUCU
4646	AAACAGAC	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUU	GUCUGUUU
4649	GGUAAACA	CUGAUGA	X	GAA	ACAACAGA	UCUGUUGUC	UGUUUACC
4653	GGAUGGUA	CUGAUGA	X	GAA	ACAGACAA	UUGUCUGUU	UACCAUCC
4654	UGGAUGGU	CUGAUGA	X	GAA	AACAGACA	UGUCUGUUU	ACCAUCCA
4655	UUGGAUGG	CUGAUGA	X	GAA	AAACAGAC	GUCUGUUUA	CCAUCCAA
4660	AUGCUUUG	CUGAUGA	X	GAA	AUGGUAAA	UUUACCAUC	CAAAGCAU
4669	AUGUUAAA	CUGAUGA	X	GAA	AUGCUUUG	CAAAGCAUA	UUUAACAU
4671	ACAUGUUA	CUGAUGA	X	GAA	AUAUGCUU	AAGCAUAUU	UAACAUGU
4672	CACAUGUU	CUGAUGA	X	GAA	AAUAUGCU	AGCAUAUUU	AACAUGUG
4673	ACACAUGU	CUGAUGA	X	GAA	AAAUAUGC	GCAUAUUUA	ACAUGUGU
4682	CCCCCACU	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUC	AGUGGGGG
4698	CAGAAGCC	CUGAUGA	X	GAA	AGCGCCAC	GUGGCGCUU	GGCUUCUG

4703	GGCCUCAG CUGAUGA X GAA AGCCAAGC	GCUUGGCUU CUGAGGCC
4704	UGGCCUCA CUGAUGA X GAA AAGCCAAG	CUUGGCUUC UGAGGCCA
4720	GAACUGAU CUGAUGA X GAA AUGGCUCU	AGAGCCAUC AUCAGUUC
4723	GAGGAACU CUGAUGA X GAA AUGAUGGC	GCCAUCAUC AGUUCCUC
4727	ACUAGAGG CUGAUGA X GAA ACUGAUGA	UCAUCAGUU CCUCUAGU
4728	CACUAGAG CUGAUGA X GAA AACUGAUG	CAUCAGUUC CUCUAGUG
4731	UCUCACUA CUGAUGA X GAA AGGAACUG	CAGUUCCUC UAGUGAGA
4733	CAUCUCAC CUGAUGA X GAA AGAGGAAC	GUUCCUCUA GUGAGAUG
4745	AUGACCUC CUGAUGA X GAA AUGCAUCU	AGAUGCAUU GAGGUCAU
4751	UUGGGUAU CUGAUGA X GAA ACCUCAAU	AUUGAGGUC AUACCCAA
4754	AGCUUGGG CUGAUGA X GAA AUGACCUC	GAGGUCAUA CCCAAGCU
4763	AGGCCUGC CUGAUGA X GAA AGCUUGGG	CCCAAGCUU GCAGGCCU
4777	AGUAUGCG CUGAUGA X GAA AGGUCAGG	CCUGACCUU CGCAUACU
4778	CAGUAUGC CUGAUGA X GAA AAGGUCAG	CUGACCUUC GCAUACUG
4783	GUGAGCAG CUGAUGA X GAA AUGCGAAG	CUUCGCAUA CUGCUCAC
4789	CUCCCCGU CUGAUGA X GAA AGCAGUAU	AUACUGCUC ACGGGGAG
4799	GACCACUU CUGAUGA X GAA ACUCCCCG	CGGGGAGUU AAGUGGUC
4800	GGACCACU CUGAUGA X GAA AACUCCCC	GGGGAGUUA AGUGGUCC
4807	CCAAACUG CUGAUGA X GAA ACCACUUA	UAAGUGGUC CAGUUUGG
4812	CUAGGCCA CUGAUGA X GAA ACUGGACC	GGUCCAGUU UGGCCUAG
4813	ACUAGGCC CUGAUGA X GAA AACUGGAC	GUCCAGUUU GGCCUAGU
4819	AACCUUAC CUGAUGA X GAA AGGCCAAA	UUUGGCCUA GUAAGGUU
4822	GGCAACCU CUGAUGA X GAA ACUAGGCC	GGCCUAGUA AGGUUGCC
4827	CAGUAGGC CUGAUGA X GAA ACCUUACU	AGUAAGGUU GCCUACUG
4832	CCCAUCAG CUGAUGA X GAA AGGCAACC	GGUUGCCUA CUGAUGGG
4843	UGGCUUUU CUGAUGA X GAA AGCCCAUC	GAUGGGCUC AAAAGCCA
4855	CUGUUUAA CUGAUGA X GAA AUGUGGCU	AGCCACAUU UUAAACAG
4856	CCUGUUUA CUGAUGA X GAA AAUGUGGC	GCCACAUUU UAAACAGG
4857	ACCUGUUU CUGAUGA X GAA AAAUGUGG	CCACAUUUU AAACAGGU
4858	AACCUGUU CUGAUGA X GAA AAAAUGUG	CACAUUUUA AACAGGUU
4866	UGAGAUAA CUGAUGA X GAA ACCUGUUU	AAACAGGUU UUAUCUCA
4867	UUGAGAUA CUGAUGA X GAA AACCUGUU	AACAGGUUU UAUCUCAA
4868	CUUGAGAU CUGAUGA X GAA AAACCUGU	ACAGGUUUU AUCUCAAG

4869	ACUUGAGA CUGAUGA X GAA AAAACCUG	CAGGUUUUA UCUCAAGU
4871	AUACUUGA CUGAUGA X GAA AUAAAACC	GGUUUUAUC UCAAGUAU
4873	UAAUACUU CUGAUGA X GAA AGAUAAAA	UUUUAUCUC AAGUAUUA
4878	UAUAUUAA CUGAUGA X GAA ACUUGAGA	UCUCAAGUA UUAAUAUA
4880	UAUAUAUU CUGAUGA X GAA AUACUUGA	UCAAGUAUU AAUAUAUA
4881	CUAUAUAU CUGAUGA X GAA AAUACUUG	CAAGUAUUA AUAUAUAG
4884	UGUCUAUA CUGAUGA X GAA AUUAAUAC	GUAUUAAUA UAUAGACA
4886	CUUGUCUA CUGAUGA X GAA AUAUUAAU	AUUAAUAUA UAGACAAG
4888	GUCUUGUC CUGAUGA X GAA AUAUAUUA	UAAUAUAUA GACAAGAC
4900	UAAUGCAU CUGAUGA X GAA AGUGUCUU	AAGACACUU AUGCAUUA
4901	AUAAUGCA CUGAUGA X GAA AAGUGUCU	AGACACUUA UGCAUUAU
4907	AACAGGAU CUGAUGA X GAA AUGCAUAA	UUAUGCAUU AUCCUGUU
4908	AAACAGGA CUGAUGA X GAA AAUGCAUA	UAUGCAUUA UCCUGUUU
4910	UAAAACAG CUGAUGA X GAA AUAAUGCA	UGCAUUAUC CUGUUUUA
4915	AUAUAUAA CUGAUGA X GAA ACAGGAUA	UAUCCUGUU UUAUAUAU
4916	GAUAUAUA CUGAUGA X GAA AACAGGAU	AUCCUGUUU UAUAUAUC
4917	GGAUAUAU CUGAUGA X GAA AAACAGGA	UCCUGUUUU AUAUAUCC
4918	UGGAUAUA CUGAUGA X GAA AAAACAGG	CCUGUUUUA UAUAUCCA
4920	AUUGGAUA CUGAUGA X GAA AUAAAACA	UGUUUUAUA UAUCCAAU
4922	UCAUUGGA CUGAUGA X GAA AUAUAAAA	UUUUAUAUA UCCAAUGA
4924	AUUCAUUG CUGAUGA X GAA AUAUAUAA	UUAUAUAUC CAAUGAAU
4933	CCCAGUUA CUGAUGA X GAA AUUCAUUG	CAAUGAAUA UAACUGGG
4935	GCCCCAGU CUGAUGA X GAA AUAUUCAU	AUGAAUAUA ACUGGGGC
4948	UGACUCUU CUGAUGA X GAA ACUCGCCC	GGGCGAGUU AAGAGUCA
4949	AUGACUCU CUGAUGA X GAA AACUCGCC	GGCGAGUUA AGAGUCAU
4955	UAGACCAU CUGAUGA X GAA ACUCUUAA	UUAAGAGUC AUGGUCUA
4961	CUUUUCUA CUGAUGA X GAA ACCAUGAC	GUCAUGGUC UAGAAAAG
4963	CCCUUUUC CUGAUGA X GAA AGACCAUG	CAUGGUCUA GAAAAGGG
4974	UACAGAGA CUGAUGA X GAA ACCCCUUU	AAAGGGGUU UCUCUGUA
4975	GUACAGAG CUGAUGA X GAA AACCCCUU	AAGGGGUUU CUCUGUAC
4976	GGUACAGA CUGAUGA X GAA AAACCCCU	AGGGGUUUC UCUGUACC
4978	UGGGUACA CUGAUGA X GAA AGAAACCC	GGGUUUCUC UGUACCCA
4982	GAUUUGGG CUGAUGA X GAA ACAGAGAA	UUCUCUGUA CCCAAAUC

4990	ACCAGCCC	CUGAUGA	X	GAA	AUUUGGGU	ACCCAAAUC GGGCUGGU
4999	CUUGGUCC	CUGAUGA	X	GAA	ACCAGCCC	GGGCUGGUU GGACCAAG
5029	GCUGGGAC	CUGAUGA	X	GAA	ACCACUCU	AGAGUGGUU GUCCCAGC
5032	AUAGCUGG	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUC CCAGCUAU
5039	AGUAACUA	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUA UAGUUACU
5041	UUAGUAAC	CUGAUGA	X	GAA	AUAGCUGG	CCAGCUAUA GUUACUAA
5044	AGUUUAGU	CUGAUGA	X	GAA	ACUAUAGC	GCUAUAGUU ACUAAACU
5045	UAGUUUAG	CUGAUGA	X	GAA	AACUAUAG	CUAUAGUUA CUAAACUA
5048	GAGUAGUU	CUGAUGA	X	GAA	AGUAACUA	UAGUUACUA AACUACUC
5053	UGGGUGAG	CUGAUGA	X	GAA	AGUUUAGU	ACUAAACUA CUCACCCA
5056	CUUUGGGU	CUGAUGA	X	GAA	AGUAGUUU	AAACUACUC ACCCAAAG
5066	GAGGUCCC	CUGAUGA	X	GAA	ACUUUGGG	CCCAAAGUU GGGACCUC
5074	AAGCCAGU	CUGAUGA	X	GAA	AGGUCCCA	UGGGACCUC ACUGGCUU
5082	GUAAAGAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCUU CUCUUUAC
5083	AGUAAAGA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUC UCUUUACU
5085	GAAGUAAA	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUC UUUACUUC
5087	AUGAAGUA	CUGAUGA	X	GAA	AGAGAAGC	GCUUCUCUU UACUUCAU
5088	GAUGAAGU	CUGAUGA	X	GAA	AAGAGAAG	CUUCUCUUU ACUUCAUC
5089	UGAUGAAG	CUGAUGA	X	GAA	AAAGAGAA	UUCUCUUUA CUUCAUCA
5092	CCAUGAUG	CUGAUGA	X	GAA	AGUAAAGA	UCUUUACUU CAUCAUGG
5093	UCCAUGAU	CUGAUGA	X	GAA	AAGUAAAG	CUUUACUUC AUCAUGGA
5096	AAAUCCAU	CUGAUGA	X	GAA	AUGAAGUA	UACUUCAUC AUGGAUUU
5103	GAUGGUGA	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUU UCACCAUC
5104	GGAUGGUG	CUGAUGA	X	GAA	AAUCCAUG	CAUGGAUUU CACCAUCC
5105	GGGAUGGU	CUGAUGA	X	GAA	AAAUCCAU	AUGGAUUUC ACCAUCCC
5111	UGCCUUGG	CUGAUGA	X	GAA	AUGGUGAA	UUCACCAUC CCAAGGCA
5122	UCCUCUCA	CUGAUGA	X	GAA	ACUGCCUU	AAGGCAGUC UGAGAGGA
5134	AUACUCUU	CUGAUGA	X	GAA	AGCUCCUC	GAGGAGCUA AAGAGUAU
5141	UGGGCUGA	CUGAUGA	X	GAA	ACUCUUUA	UAAAGAGUA UCAGCCCA
5143	UAUGGGCU	CUGAUGA	X	GAA	AUACUCUU	AAGAGUAUC AGCCCAUA
5151	UUAAUAAA	CUGAUGA	X	GAA	AUGGGCUG	CAGCCCAUA UUUAUUAA
5153	GCUUAAUA	CUGAUGA	X	GAA	AUAUGGGC	GCCCAUAUU UAUUAAGC
5154	UGCUUAAU	CUGAUGA	X	GAA	AAUAUGGG	CCCAUAUUU AUUAAGCA

5155	GUGCUUAA CUGAUGA X GAA AAAUAUGG	CCAUAUUUA UUAAGCAC
5157	AAGUGCUU CUGAUGA X GAA AUAAAUAU	AUAUUUAUU AAGCACUU
5158	AAAGUGCU CUGAUGA X GAA AAUAAAUA	UAUUUAUUA AGCACUUU
5165	GGAGCAUA CUGAUGA X GAA AGUGCUUA	UAAGCACUU UAUGCUCC
5166	AGGAGCAU CUGAUGA X GAA AAGUGCUU	AAGCACUUU AUGCUCCU
5167	AAGGAGCA CUGAUGA X GAA AAAGUGCU	AGCACUUUA UGCUCCUU
5172	GUGCCAAG CUGAUGA X GAA AGCAUAAA	UUUAUGCUC CUUGGCAC
5175	GCUGUGCC CUGAUGA X GAA AGGAGCAU	AUGCUCCUU GGCACAGC
5195	GCAUAAAU CUGAUGA X GAA ACACAUCA	UGAUGUGUA AUUUAUGC
5198	CUUGCAUA CUGAUGA X GAA AUUACACA	UGUGUAAUU UAUGCAAG
5199	GCUUGCAU CUGAUGA X GAA AAUUACAC	GUGUAAUUU AUGCAAGC
5200	AGCUUGCA CUGAUGA X GAA AAAUUACA	UGUAAUUUA UGCAAGCU
5209	UGGAGAGG CUGAUGA X GAA AGCUUGCA	UGCAAGCUC CCUCUCCA
5213	UAGCUGGA CUGAUGA X GAA AGGGAGCU	AGCUCCCUC UCCAGCUA
5215	CCUAGCUG CUGAUGA X GAA AGAGGGAG	CUCCCUCUC CAGCUAGG
5221	CUGAGUCC CUGAUGA X GAA AGCUGGAG	CUCCAGCUA GGACUCAG
5227	AAUAUCCU CUGAUGA X GAA AGUCCUAG	CUAGGACUC AGGAUAUU
5233	UUGACUAA CUGAUGA X GAA AUCCUGAG	CUCAGGAUA UUAGUCAA
5235	CAUUGACU CUGAUGA X GAA AUAUCCUG	CAGGAUAUU AGUCAAUG
5236	UCAUUGAC CUGAUGA X GAA AAUAUCCU	AGGAUAUUA GUCAAUGA
5239	GGCUCAUU CUGAUGA X GAA ACUAAUAU	AUAUUAGUC AAUGAGCC
5250	UUCCUUUU CUGAUGA X GAA AUGGCUCA	UGAGCCAUC AAAAGGAA
5273	AAAUAAGA CUGAUGA X GAA AGGUUUUU	AAAAACCUA UCUUAUUU
5275	GAAAAUAA CUGAUGA X GAA AUAGGUUU	AAACCUAUC UUAUUUUC
5277	AUGAAAAU CUGAUGA X GAA AGAUAGGU	ACCUAUCUU AUUUUCAU
5278	GAUGAAAA CUGAUGA X GAA AAGAUAGG	CCUAUCUUA UUUUCAUC
5280	CAGAUGAA CUGAUGA X GAA AUAAGAUA	UAUCUUAUU UUCAUCUG
5281	ACAGAUGA CUGAUGA X GAA AAUAAGAU	AUCUUAUUU UCAUCUGU
5282	AACAGAUG CUGAUGA X GAA AAAUAAGA	UCUUAUUUU CAUCUGUU
5283	AAACAGAU CUGAUGA X GAA AAAAUAAG	CUUAUUUUC AUCUGUUU
5286	AUGAAACA CUGAUGA X GAA AUGAAAAU	AUUUUCAUC UGUUUCAU
5290	AGGUAUGA CUGAUGA X GAA ACAGAUGA	UCAUCUGUU UCAUACCU
5291	AAGGUAUG CUGAUGA X GAA AACAGAUG	CAUCUGUUU CAUACCUU

5292	CAAGGUAU	CUGAUGA	X	GAA	AAACAGAU	AUCUGUUUC	AUACCUUG
5295	AGACAAGG	CUGAUGA	X	GAA	AUGAAACA	UGUUUCAUA	CCUUGUCU
5299	CCCCAGAC	CUGAUGA	X	GAA	AGGUAUGA	UCAUACCUU	GUCUGGGG
5302	AGACCCCA	CUGAUGA	X	GAA	ACAAGGUA	UACCUUGUC	UGGGGUCU
5309	CGUCAUUA	CUGAUGA	X	GAA	ACCCCAGA	UCUGGGGUC	UAAUGACG
5311	AUCGUCAU	CUGAUGA	X	GAA	AGACCCCA	UGGGGUCUA	AUGACGAU
5331	CCCAUGUC	CUGAUGA	X	GAA	ACCCUGUU	AACAGGGUA	GACAUGGG
5350	CCCUUUUC	CUGAUGA	X	GAA	ACCCUGUC	GACAGGGUA	GAAAAGGG
5367	ACCCCAAA	CUGAUGA	X	GAA	AGCGGGCA	UGCCCGCUC	UUUGGGGU
5369	AGACCCCA	CUGAUGA	X	GAA	AGAGCGGG	CCCGCUCUU	UGGGGUCU
5370	UAGACCCC	CUGAUGA	X	GAA	AAGAGCGG	CCGCUCUUU	GGGGUCUA
5376	CAUCUCUA	CUGAUGA	X	GAA	ACCCCAAA	UUUGGGGUC	UAGAGAUG
5378	CUCAUCUC	CUGAUGA	X	GAA	AGACCCCA	UGGGGUCUA	GAGAUGAG
5395	AUUUUAGA	CUGAUGA	X	GAA	ACCCAGGG	CCCUGGGUC	UCUAAAAU
5397	CCAUUUUA	CUGAUGA	X	GAA	AGACCCAG	CUGGGUCUC	UAAAAUGG
5399	AGCCAUUU	CUGAUGA	X	GAA	AGAGACCC	GGGUCUCUA	AAAUGGCU
5408	UUCUAAGA	CUGAUGA	X	GAA	AGCCAUUU	AAAUGGCUC	UCUUAGAA
5410	ACUUCUAA	CUGAUGA	X	GAA	AGAGCCAU	AUGGCUCUC	UUAGAAGU
5412	CAACUUCU	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUU	AGAAGUUG
5413	ACAACUUC	CUGAUGA	X	GAA	AAGAGAGC	GCUCUCUUA	GAAGUUGU
5419	GCACAUAC	CUGAUGA	X	GAA	ACUUCUAA	UUAGAAGUU	GUAUGUGC
5422	UUUGCACA	CUGAUGA	X	GAA	ACAACUUC	GAAGUUGUA	UGUGCAAA
5432	CAGACCAU	CUGAUGA	X	GAA	AUUUGCAC	GUGCAAAUU	AUGGUCUG
5433	ACAGACCA	CUGAUGA	X	GAA	AAUUUGCA	UGCAAAUUA	UGGUCUGU
5438	AGCACACA	CUGAUGA	X	GAA	ACCAUAAU	AUUAUGGUC	UGUGUGCU
5447	CACGACCU	CUGAUGA	X	GAA	AGCACACA	UGUGUGCUU	AGGUCGUG
5448	GCACGACC	CUGAUGA	X	GAA	AAGCACAC	GUGUGCUUA	GGUCGUGC
5452	GUGUGCAC	CUGAUGA	X	GAA	ACCUAAGC	GCUUAGGUC	GUGCACAC
5475	CCAGCUGU	CUGAUGA	X	GAA	ACCGGCUC	GAGCCGGUC	ACAGCUGG
5497	AAAGCAGC	CUGAUGA	X	GAA	AUUCAUCG	CGAUGAAUA	GCUGCUUU
5504	CUCUCCCA	CUGAUGA	X	GAA	AGCAGCUA	UAGCUGCUU	UGGGAGAG
5505	GCUCUCCC	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	GGGAGAGC
5524	UAAGUGGC	CUGAUGA	X	GAA	AGCAUGCU	AGCAUGCUA	GCCACUUA

5531	AGAGAAUU	CUGAUGA	X	GAA	AGUGGCUA	UAGCCACUU	AAUUCUCU
5532	CAGAGAAU	CUGAUGA	X	GAA	AAGUGGCU	AGCCACUUA	AUUCUCUG
5535	GGUCAGAG	CUGAUGA	X	GAA	AUUAAGUG	CACUUAAUU	CUCUGACC
5536	CGGUCAGA	CUGAUGA	X	GAA	AAUUAAGU	ACUUAAUUC	UCUGACCG
5538	CCCGGUCA	CUGAUGA	X	GAA	AGAAUUAA	UUAAUUCUC	UGACCGGG
5554	GUACCCAU	CUGAUGA	X	GAA	AUGCUGGC	GCCAGCAUC	AUGGGUAC
5561	GGAGCAGG	CUGAUGA	X	GAA	ACCCAUGA	UCAUGGGUA	CCUGCUCC
5568	ACACAGGG	CUGAUGA	X	GAA	AGCAGGUA	UACCUGCUC	CCCUGUGU
5577	GGAUGGGG	CUGAUGA	X	GAA	ACACAGGG	CCCUGUGUA	CCCCAUCC
5584	ACCUUAAG	CUGAUGA	X	GAA	AUGGGGUA	UACCCCAUC	CUUAAGGU
5587	AAAACCUU	CUGAUGA	X	GAA	AGGAUGGG	CCCAUCCUU	AAGGUUUU
5588	GAAAACCU	CUGAUGA	X	GAA	AAGGAUGG	CCAUCCUUA	AGGUUUUC
5593	AGACAGAA	CUGAUGA	X	GAA	ACCUUAAG	CUUAAGGUU	UUCUGUCU
5594	CAGACAGA	CUGAUGA	X	GAA	AACCUUAA	UUAAGGUUU	UCUGUCUG
5595	UCAGACAG	CUGAUGA	X	GAA	AAACCUUA	UAAGGUUUU	CUGUCUGA
5596	AUCAGACA	CUGAUGA	X	GAA	AAAACCUU	AAGGUUUUC	UGUCUGAU
5600	UCUCAUCA	CUGAUGA	X	GAA	ACAGAAAA	UUUUCUGUC	UGAUGAGA
5627	UCAGUGGG	CUGAUGA	X	GAA	AUUGCACU	AGUGCAAUC	CCCACUGA
5660	UGCACCAA	CUGAUGA	X	GAA	AGCCACAG	CUGUGGCUC	UUGGUGCA
5662	AGUGCACC	CUGAUGA	X	GAA	AGAGCCAC	GUGGCUCUU	GGUGCACU
5671	UGGCUGGU	CUGAUGA	X	GAA	AGUGCACC	GGUGCACUC	ACCAGCCA
5685	UACUUGUC	CUGAUGA	X	GAA	AGUCCUGG	CCAGGACUA	GACAAGUA
5693	CCCUUUCC	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUA	GGAAAGGG
5704	GUGGCUAG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU	CUAGCCAC
5705	UGUGGCUA	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC	UAGCCACA
5707	AGUGUGGC	CUGAUGA	X	GAA	AGAAGCCC	GGGCUUCUA	GCCACACU
5731	CCCUACCU	CUGAUGA	X	GAA	AUUUUCUU	AAGAAAAUC	AGGUAGGG
5736	GCCAGCCC	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	GGGCUGGC
5754	UGGACAAA	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUC	UUUGUCCA
5756	AAUGGACA	CUGAUGA	X	GAA	AGAUGUCU	AGACAUCUU	UGUCCAUU
5757	GAAUGGAC	CUGAUGA	X	GAA	AAGAUGUC	GACAUCUUU	GUCCAUUC
5760	UGCGAAUG	CUGAUGA	X	GAA	ACAAAGAU	AUCUUUGUC	CAUUCGCA
5764	CUUUUGCG	CUGAUGA	X	GAA	AUGGACAA	UUGUCCAUU	CGCAAAAG

5765	GCUUUUGC CUGAUGA X GAA AAUGGACA	UGUCCAUUC GCAAAAGC
5775	GCCGACAA CUGAUGA X GAA AGCUUUUG	CAAAAGCUC UUGUCGGC
5777	CAGCCGAC CUGAUGA X GAA AGAGCUUU	AAAGCUCUU GUCGGCUG
5780	CUGCAGCC CUGAUGA X GAA ACAAGAGC	GCUCUUGUC GGCUGCAG
5794	GCCUGACU CUGAUGA X GAA ACACACUG	CAGUGUGUA AGUCAGGC
5798	CAUCGCCU CUGAUGA X GAA ACUUACAC	GUGUAAGUC AGGCGAUG
5818	UUCUCUGG CUGAUGA X GAA AGCCUCUG	CAGAGGCUA CCAGAGAA
5852	GGAUGAGA CUGAUGA X GAA ACCUCAGG	CCUGAGGUU UCUCAUCC
5853	UGGAUGAG CUGAUGA X GAA AACCUCAG	CUGAGGUUU CUCAUCCA
5854	CUGGAUGA CUGAUGA X GAA AAACCUCA	UGAGGUUUC UCAUCCAG
5856	AUCUGGAU CUGAUGA X GAA AGAAACCU	AGGUUUCUC AUCCAGAU
5859	GAUAUCUG CUGAUGA X GAA AUGAGAAA	UUUCUCAUC CAGAUAUC
5865	UUGCUGGA CUGAUGA X GAA AUCUGGAU	AUCCAGAUA UCCAGCAA
5867	AAUUGCUG CUGAUGA X GAA AUAUCUGG	CCAGAUAUC CAGCAAUU
5875	CACCCCCC CUGAUGA X GAA AUUGCUGG	CCAGCAAUU GGGGGGUG
5896	GGACCAUC CUGAUGA X GAA AUGGUCUU	AAGACCAUA GAUGGUCC
5903	UAAUACAG CUGAUGA X GAA ACCAUCUA	UAGAUGGUC CUGUAUUA
5908	CGGAAUAA CUGAUGA X GAA ACAGGACC	GGUCCUGUA UUAUUCCG
5910	AUCGGAAU CUGAUGA X GAA AUACAGGA	UCCUGUAUU AUUCCGAU
5911	AAUCGGAA CUGAUGA X GAA AAUACAGG	CCUGUAUUA UUCCGAUU
5913	AAAAUCGG CUGAUGA X GAA AUAAUACA	UGUAUUAUU CCGAUUUU
5914	UAAAAUCG CUGAUGA X GAA AAUAAUAC	GUAUUAUUC CGAUUUUA
5919	AUUAUUAA CUGAUGA X GAA AUCGGAAU	AUUCCGAUU UUAAUAAU
5920	GAUUAUUA CUGAUGA X GAA AAUCGGAA	UUCCGAUUU UAAUAAUC
5921	AGAUUAUU CUGAUGA X GAA AAAUCGGA	UCCGAUUUU AAUAAUCU
5922	UAGAUUAU CUGAUGA X GAA AAAAUCGG	CCGAUUUUA AUAAUCUA
5925	AAUUAGAU CUGAUGA X GAA AUUAAAAU	AUUUUAAUA AUCUAAUU
5928	ACGAAUUA CUGAUGA X GAA AUUAUUAA	UUAAUAAUC UAAUUCGU
5930	UCACGAAU CUGAUGA X GAA AGAUUAUU	AAUAAUCUA AUUCGUGA
5933	UGAUCACG CUGAUGA X GAA AUUAGAUU	AAUCUAAUU CGUGAUCA
5934	AUGAUCAC CUGAUGA X GAA AAUUAGAU	AUCUAAUUC GUGAUCAU
5940	CUCUUAAU CUGAUGA X GAA AUCACGAA	UUCGUGAUC AUUAAGAG
5943	AGUCUCUU CUGAUGA X GAA AUGAUCAC	GUGAUCAUU AAGAGACU

5944	AAGUCUCU	CUGAUGA	X	GAA	AAUGAUCA	UGAUCAUUA AGAGACUU
5952	AUUUACUA	CUGAUGA	X	GAA	AGUCUCUU	AAGAGACUU UAGUAAAU
5953	CAUUUACU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUU AGUAAAUG
5954	ACAUUUAC	CUGAUGA	X	GAA	AAAGUCUC	GAGACUUUA GUAAAUGU
5957	GGGACAUU	CUGAUGA	X	GAA	ACUAAAGU	ACUUUAGUA AAUGUCCC
5963	GGAAAAGG	CUGAUGA	X	GAA	ACAUUUAC	GUAAAUGUC CCUUUUCC
5967	UGUGGGAA	CUGAUGA	X	GAA	AGGGACAU	AUGUCCCUU UUCCCACA
5968	UUGUGGGA	CUGAUGA	X	GAA	AAGGGACA	UGUCCCUUU UCCCACAA
5969	UUUGUGGG	CUGAUGA	X	GAA	AAAGGGAC	GUCCCUUUU CCCACAAA
5970	UUUUGUGG	CUGAUGA	X	GAA	AAAAGGGA	UCCCUUUUC CCACAAAA
5981	CUUUUCUU	CUGAUGA	X	GAA	ACUUUUGU	ACAAAAGUA AAGAAAAG
5992	AAUCCCGA	CUGAUGA	X	GAA	AGCUUUUC	GAAAAGCUA UCGGGAUU
5994	AGAAUCCC	CUGAUGA	X	GAA	AUAGCUUU	AAAGCUAUC GGGAUUCU
6000	AACCAGAG	CUGAUGA	X	GAA	AUCCCGAU	AUCGGGAUU CUCUGGUU
6001	GAACCAGA	CUGAUGA	X	GAA	AAUCCCGA	UCGGGAUUC UCUGGUUC
6003	CAGAACCA	CUGAUGA	X	GAA	AGAAUCCC	GGGAUUCUC UGGUUCUG
6008	UUAAGCAG	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU CUGCUUAA
6009	UUUAAGCA	CUGAUGA	X	GAA	AACCAGAG	CUCUGGUUC UGCUUAAA
6014	AAGUCUUU	CUGAUGA	X	GAA	AGCAGAAC	GUUCUGCUU AAAGACUU
6015	UAAGUCUU	CUGAUGA	X	GAA	AAGCAGAA	UUCUGCUUA AAGACUUA
6022	CCAAAGCU	CUGAUGA	X	GAA	AGUCUUUA	UAAAGACUU AGCUUUGG
6023	UCCAAAGC	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUA GCUUUGGA
6027	AGGCUCCA	CUGAUGA	X	GAA	AGCUAAGU	ACUUAGCUU UGGAGCCU
6028	UAGGCUCC	CUGAUGA	X	GAA	AAGCUAAG	CUUAGCUUU GGAGCCUA
6036	AACUUUCA	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA UGAAAGUU
6044	GGCUGAUC	CUGAUGA	X	GAA	ACUUUCAU	AUGAAAGUU GAUCAGCC

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res*. 20 3252). The length of stem II may be ≥ 2 base-pairs.

Table IX: Mouse *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt. Position	HP Ribozyme Sequence	Substrate
33	GUCCCAGC AGAA GACCAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGGUCA GCU GCUGGGAC
36	GGUGUCCC AGAA GCUGAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCAGCU GCU GGGACACC
50	UAAGGCAA AGAA GCGGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACCGCG GUC UUGCCUUA
67	GACACCCG AGAA GCGCGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACGCGCU GCU CGGGUGUC
79	CUGUGAGA AGAA GACACC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUGUCU GCU UCUCACAG
166	GAAAGAGA AGAA GGCCUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGGCCA GAC UCUCUUUC
197	CAUGAGUG AGAA GCCUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGGCA GCC CACUCAUG
214	CGGUCGUG AGAA GAGACC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUCUCU GCC CACGACCG
266	CUCCCACA AGAA GAUGGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCAUCG GCC UGUGGGAG
487	GGAUGAUG AGAA GUCUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGACA GCU CAUCAUCC
501	CGUCACCC AGAA GGGGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCCCCU GCC GGGUGACG
566	CUUUGCCC AGAA GGGGUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACCCCU GAU GGGCAAAG
640	CGCAGUUC AGAA GUCCUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAGGACU GCU GAACUGCG
691	GCCGAUGG AGAA GAUAGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUAUCU GAC CCAUCGGC
703	UUGUAUUG AGAA GCCGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCGGCA GAC CAAUACAA

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185

736	CUGGGCUC	AGAA	GGCGUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACGCCC	GCC	GAGCCCAG
754	GCCCGUGG	AGAA	GUCUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGACU	GCU	CCACGGGC
766	GGACAAGA	AGAA	GCCCGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACGGGCA	GAC	UCUUGUCC
871	UCCGGUCA	AGAA	GCUGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCAGCG	GAU	UGACCGGA
960	CUUCACGC	AGAA	GGUGUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACACCU	GUC	GCGUGAAG
988	UGUUGAAA	AGAA	GGAACG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGUUCCA	GUC	UUUCAACA
1051	CCUGCACC	AGAA	GCUUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAAGCA	GCC	GGUGCAGG
1081	GCCGAUAG	AGAA	GUCUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGACG	GUC	CUAUCGGC
1090	UCAUGGAC	AGAA	GAUAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUAUCG	GCU	GUCCAUGA
1093	CUUUCAUG	AGAA	GCCGAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCGGCU	GUC	CAUGAAAG
1169	AAAUAGCG	AGAA	GACUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGUCU	GCU	CGCUAUUU
1315	UUUCGUAG	AGAA	GAGGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACCUCA	GAU	CUACGAAA
1363	UGCUGCCC	AGAA	GAUAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUAUCC	GCU	GGGCAGCA
1604	GUCUGAGA	AGAA	GCCACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUGGCU	GAC	UCUCAGAC
1612	UUCCAGGG	AGAA	GAGAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUCUCA	GAC	CCCUGGAA
1629	GGCCCGGC	AGAA	GUAGAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCUACA	GCU	GCCGGGCC
1632	GAAGGCCC	AGAA	GCUGUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACAGCU	GCC	GGGCCUUC
1688	UUCGGCAC	AGAA	GUGACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUCACA	GAU	GUGCCGAA
1730	UCUCCUUC	AGAA	GGCAUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUGCCA	GCC	GAAGGAGA

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1753	CCACACAG AGAA GUUUCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAACU GUC CUGUGUGG
2017	GGUUUUGA AGAA GGUGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCU GCU UCAAAACC
2101	ACCAAGUG AGAA GAGGCG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGCCUCA GAU CACUUGGU
2176	UUUCAAUA AGAA GCGUGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACGCU GUU UAUUGAAA
2258	GUGAGGUA AGAA GCGCUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCGCA GCC UACCUCAC
2305	UGAGCGUG AGAA GCUCCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGAGCU GAU CACGCUCA
2383	CGGAAGAA AGAA GCUUCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAGCG GUC UUCUUCCG
2405	GACAGGUA AGAA GUCUUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAGACA GAC UACCUGUC
2432	GGAACUUC AGAA GGGUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACCCA GAU GAAGUUCC
2464	CAUAGGGC AGAA GUUCAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGAACG GCU GCCCUAUG
2467	CAUCAUAG AGAA GCCGUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACGGCU GCC CUAUGAUG
2592	CACAGUCC AGAA GGUGGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCACCU GCC GGACUGUG
2596	CAGCCACA AGAA GGCAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUGCCG GAC UGUGGCUG
2653	GUUCGGUC AGAA GAGCUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU GAU GACCGAAC
2743	CGAUCACC AGAA GAGGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCUCU GAU GGUGAUCG
2779	GGUAGUUG AGAA GGUUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAACCU GUC CAACUACC
2814	CUUGUUGA AGAA GAAUAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUUCU GUC UCAACAAG
2831	AUAUGCAA AGAA GCGUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACGCA GCC UUGCAUAU
2895	ACUGUCUA AGAA GGGCUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCCCC GCC UAGACAGU

2913	GACACUUG	AGAA	GCUGAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCAGCA	GCU	CAAGUGUC
2928	GAAGCUGG	AGAA	GGUGAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCACCA	GCU	CCAGCUUC
2934	UUCAGGGA	AGAA	GGAGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCUCCA	GCU	UCCCUGAA
3001	UGGUGAGG	AGAA	GCUUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAAGCA	GCC	CCUCACCA
3022	UGUAGGAA	AGAA	GGUCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGACCU	GAU	UUCCUACA
3033	CACUUGGA	AGAA	GUAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUACA	GUU	UCCAAGUG
3064	UUCUGGAG	AGAA	GAAACU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGUUUCU	GUC	CUCCAGAA
3179	CUCACAUA	AGAA	GGGUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAACCCU	GAU	UAUGUGAG
3357	CUUCAGGC	AGAA	GCAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUGCA	GCC	GCCUGAAG
3360	UUCCUUCA	AGAA	GCUGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCAGCC	GCC	UGAAGGAA
3379	GGGUUCUC	AGAA	GCAUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAUGCG	GAU	GAGAACCC
3463	GUUCAGCA	AGAA	GGGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCCCG	GUU	UGCUGAAC
3496	UGGCUUGA	AGAA	GGUCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGACCU	GCU	UCAAGCCA
3553	UGUUUCUA	AGAA	GUAUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAUACU	GAC	UAGAAACA
3615	AUCUGCAA	AGAA	GUCCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGGACG	GCU	UUGCAGAU
3623	AAAUGUGG	AGAA	GCAAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUUGCA	GAU	CCACAUUU
3650	CUCACAUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GAUGUGAG
3754	UAGUGUCC	AGAA	GAUAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUAUCA	GCU	GGACACUA
3772	GGGAGCCC	AGAA	GAGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACUCU	GCU	GGGCUCCC

188

3796	UCCAGGUG	AGAA	GCUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAGCG	GUU	CACCUGGA
3881	CUCGGCAG	AGAA	GAAAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUUUCC	GAU	CUGCCGAG
3886	UGGGCCUC	AGAA	GAUCGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCGAUCU	GCC	GAGGCCCA
3897	GAAGCAGA	AGAA	GGGCCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGCCCA	GCU	UCUGCUUC
3903	GCUGGAGA	AGAA	GAAGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCUUCU	GCU	UCUCCAGC
3912	GUGGCCAC	AGAA	GGAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUCCA	GCU	GUGGCCAC
3969	UGGAGAAC	AGAA	GGACUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGUCCU	GCU	GUUCUCCA
3972	GGGUGGAG	AGAA	GCAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUGCU	GUU	CUCCACCC
3986	GAGUUGUA	AGAA	GGGGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCCCCA	GAC	UACAACUC
4018	UUUAGGCG	AGAA	GGGAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUCCCC	GCC	CGCCUAAA
4022	AAGCUUUA	AGAA	GGCGGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCGCCC	GCC	UAAAGCUU
4040	GUUGUCGG	AGAA	GGUGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCACCA	GCC	CCGACAAC
4053	CUGUCAGG	AGAA	GGUUGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACAACCA	GCC	CCUGACAG
4095	UCCUGUGG	AGAA	GAAUAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUAUUCC	GCU	CCACAGGA
4110	CGAAAAGC	AGAA	GGCUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGCCA	GCU	GCUUUUCG
4113	UCACGAAA	AGAA	GCUGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCAGCU	GCU	UUUCGUGA
4168	UUAGUCAA	AGAA	GCAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUGCU	GUU	UUGACUAA
4290	GGUGGGCG	AGAA	GUCGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCGACC	GCC	CGCCCACC
4294	GGCCGGUG	AGAA	GGCGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCGCCC	GCC	CACCGGCC

189

4329	AGUCCCAC	AGAA	GCAGGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCUGCA	GCU	GUGGGACU
4378	CAGAGCAG	AGAA	GUGCAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGCACU	GAC	CUGCUCUG
4383	AGAGACAG	AGAA	GGUCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGACCU	GCU	CUGUCUCU
4388	AUAAGAGA	AGAA	GAGCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCUCU	GUC	UCUCUUAU
4457	CUCCACAG	AGAA	GACGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCGUCC	GUC	CUGUGGAG
4525	CCCGAAAC	AGAA	GAGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCUCC	GCU	GUUUCGGG
4528	GGGCCCGA	AGAA	GCGGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCGCU	GUU	UCGGGCCC
4643	AAACAGAC	AGAA	GAAGAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCUUCU	GUU	GUCUGUUU
4650	GGAUGGUA	AGAA	GACAAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUGUCU	GUU	UACCAUCC
4724	ACUAGAGG	AGAA	GAUGAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCAUCA	GUU	CCUCUAGU
4771	AUGCGAAG	AGAA	GGCCUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGGCCU	GAC	CUUCGCAU
4785	UCCCCGUG	AGAA	GUAUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAUACU	GCU	CACGGGGA
4809	CUAGGCCA	AGAA	GGACCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGUCCA	GUU	UGGCCUAG
4834	UUGAGCCC	AGAA	GUAGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCUACU	GAU	GGGCUCAA
4912	AUAUAUAA	AGAA	GGAUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUCCU	GUU	UUAUAUAU
5119	UCCUCUCA	AGAA	GCCUUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAAGGCA	GUC	UGAGAGGA
5144	UAAAUAUG	AGAA	GAUACU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGUAUCA	GCC	CAUAUUUA
5287	AGGUAUGA	AGAA	GAUGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCAUCU	GUU	UCAUACCU
5363	CCCCAAAG	AGAA	GGCACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUGCCC	GCU	CUUUGGGG

190

5462	CCGGCUCC	AGAA	GGUGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCU	GCC	GGAGCCGG
5478	GUCUGCCC	AGAA	GUGACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUCACA	GCU	GGGCAGAC
5486	UAUUCAUC	AGAA	GCCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGGCA	GAC	GAUGAAUA
5500	UCUCCCAA	AGAA	GCUAUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUAGCU	GCU	UUGGGAGA
5539	CUGGCCCG	AGAA	GAGAAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUCUCU	GAC	CGGGCCAG
5564	CACAGGGG	AGAA	GGUACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUACCU	GCU	CCCCUGUG
5597	UCUCAUCA	AGAA	GAAAAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUUUCU	GUC	UGAUGAGA
5601	CCAGUCUC	AGAA	GACAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGUCU	GAU	GAGACUGG
5639	GGGCUGCA	AGAA	GUCUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGACA	GCC	UGCAGCCC
5646	CCACAGUG	AGAA	GCAGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCUGCA	GCC	CACUGUGG
5781	CACACUGC	AGAA	GACAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUGUCG	GCU	GCAGUGUG
5829	CUGUUCUC	AGAA	GUUUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAAACG	GAU	GAGAACAG
5842	AAACCUCA	AGAA	GCUGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACAGCA	GCC	UGAGGUUU
5915	UUAUUAAA	AGAA	GAAUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUUCC	GAU	UUUAAUAA
6010	AGUCUUUA	AGAA	GAACCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGUUCU	GCU	UAAAGACU

Table X: Homologous Hammerhead Ribozyme Target Sites Between Human flt-1 and KDR RNA

nt. Position	flt-1 Target Sequence	nt. Position	KDR Target Sequence
3388	CCGGGAU A UUUAUAA	3151	CCGGGAU A UUUAUAA
2174	AAUGUAU A CACAGGG	3069	AgUGUAU c CACAGGG
2990	UGCAAAU A UGGAAAU	2756	UGCAAAU u UGGAAAc
2693	CUCCCUU A UGAUGCC	2459	CUgCCUU A UGAUGCC
2981	GUUGAAU A CUGCAAA	2747	GUgGAAU u CUGCAAA
1359	UAUGGUU A AAAGAUG	2097	UgUGGUU u AAAGAUa
3390	GGGAUAU U UAUAAGA	3153	GGGAUAU U UAUAAag
3391	GGAUAUU U AUAAGAA	3154	GGAUAUU U AUAAagA
2925	ACGUGGU U AACCUGC	2691	AuGUGGU c AACCUuC
7140	UAUUUCU A GUCAUGA	2340	UAcUUCU u GUCAUcA
1785	CAAUAAU A GAAGGAA	1515	CucUAAU u GAAGGAA
2731	GAGACUU A AACUGGG	768	uuGACUU c AACUGGG
3974	GAUGACU A CCAGGGC	1466	GAgGACU u CCAGGGa
6590	UUAAUGU A GAAAGAA	2603	aaAAUGU u GAAAGAA
6705	GCCAUUU A UGACAAA	3227	aCaAUUU u UGACAgA
974	GUCAAAU U ACUUAGA	147	uUCAAAU U ACUUgcA
1872	AUAAAGU U GGGACUG	1602	AcAAAGU c GGGAgaG
2333	ACUUGGU U UAAAAAC	1088	AaaUGGU a UAAAAAu
2775	AAGUGGU U CAAGCAU	1745	AcaUGGU a CAAGCuU
3533	UUCUCCU U AGGUGGG	3296	UUuUCCU U AGGUGcu
3534	UCUCCUU A GGUGGGU	3297	UuUCCUU A GGUGcuU
3625	GUACUCU A CUCCUGA	4054	GagCUCU c CUCCUGu
1814	AGCACCU U GGUUGUG	1059	AGuACCU U GGUUacc
2744	GGCAAAU C ACUUGGA	147	uuCAAAU u ACUUGcA
2783	CAAGCAU C AGCAUUU	796	gAAGCAU C AGCAUaa

3613	GAGAGCU C CUGAGUA	2968	GgaAGCU C CUGAagA
4052	AAGGCCU C GCUCAAG	1923	ucuGCCU u GCUCAAG
5305	UCUCCAU A UCAAAAC	456	ggUCCAU u UCAAAuC
7158	AUGUAUU U UGUAUAC	631	gUcUAUU a UGUAcAu
1836	CUAGAAU U UCUGGAA	1007	aUgGAAU c UCUGGug
2565	CUCUCUU C UGGCUCC	2328	uguUCUU C UGGCUaC
4250	CUGUACU C CACCCCA	3388	uUaUACU a CACCagA
7124	ACAUGGU U UGGUCCU	3778	cagUGGU a UGGUuCU
436	AUGGUCU U UGCCUGA	1337	AcGGUCU a UGCCauu
2234	GCACCAU A CCUCCUG	1344	augCCAU u CCUCCcc
2763	GGGCUUU U GGAAAAG	990	uuGCUUU U GGAAguG
4229	CCAGACU A CAACUCG	767	auuGACU u CAACUgG
5301	GUUUUCU C CAUAUCA	3307	ugcUUCU C CAUAUCc
6015	AGAAUGU A UGCCUCU	1917	AcuAUGU c UGCCUug
6095	AUUCCCU A GUGAGCC	1438	AUaCCCU u GUGAaga
6236	UGUUGUU C CUCUUCU	76	UagUGUU u CUCUUga
5962	GCUUCCU U UUAUCCA	3099	auaUCCU c UUAUCgg
7629	UAUAUAU U CUCUGCU	3096	gAaAUAU c CUCUuaU

Lowercase letters are used to represent sequence variance between flt-1 and KDR RNA

Table XI: 2.5 μmol RNA Synthesis Cycle

Reagent	Equivalents	Amount	Wait Time*
Phosphoramidites	6.5	163μL	2.5
S-Ethyl Tetrazole	23.8	238μL	2.5
Acetic Anhydride	100	233 μL	5 sec
N-Methyl Imidazole	186	233 μL	5 sec
TCA	83.2	1.73 mL	21 sec
Iodine	8.0	1.18 mL	45 sec
Acetonitrile	NA	6.67 mL	NA

Claims

1. Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.

2. The nucleic acid of claim 1, wherein said receptor is flt-1, KDR and/or flk-1.

3. The nucleic acid of claim 1 or 2, wherein said molecule is an enzymatic nucleic acid molecule.

4. The nucleic acid molecule of claim 3, wherein, the binding arms of said enzymatic nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.

5. The nucleic acid molecule of claims 3 or 4, wherein said nucleic acid molecule is in a hammerhead motif.

6. The enzymatic nucleic acid molecule of claim 3 or 4, wherein said nucleic acid molecule is in a hairpin, hepatitis Delta virus, group I intron, VS nucleic acid or RNaseP nucleic acid motif.

7. The enzymatic nucleic acid molecule of any of claims 3 or 4, wherein said ribozyme comprises between 12 and 100 bases complementary to the RNA of said region.

8. The enzymatic nucleic acid of claim 7, wherein said ribozyme comprises between 14 and 24 bases complementary to the RNA of said region.

9. Enzymatic nucleic acid molecule consisting essentially of any ribozyme sequence selected from those shown in Tables II to IX.

10. A mammalian cell including a nucleic acid molecule of any of claims 1, 2 or 3.

11. The cell of claim 10, wherein said cell is a human cell.

12. An expression vector comprising nucleic acid encoding the nucleic acid molecule of any of claims 1, 2, 3 or 4, in a manner which allows expression and/or delivery of that RNA molecule within a mammalian cell.

13. The expression vector of claim 12, wherein said nucleic acid is an enzymatic nucleic acid.

14. A mammalian cell including an expression vector of any of claims 12 or 13.

15. The cell of claim 14, wherein said cell is a human cell.

16. A method for treatment of a patient having a condition associated with the level of flt-1, KDR and/or flk-1, wherein the patient, tissue donor or population of corresponding cells is administered a therapeutically effective amount of an enzymatic nucleic acid molecule of claims 1, 2, 3 or 4.

17. A method for treatment of a condition related to the level of flt-1, KDR and/or flk-1 activity by administering to a patient an expression vector of claim 12.

18. The method of claims 16 or 17, wherein said patient is a human.

19. The nucleic acid of claim 1 or 2, wherein said molecule is an antisense nucleic acid molecule.

20. The nucleic acid molecule of claim 19, wherein, said antisense nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.

21. An expression vector comprising nucleic acid encoding the antisense nucleic acid molecule of any one of claims 19 or 20, in a manner which allows expression and/or delivery of that antisense RNA molecule within a mammalian cell.

22. A mammalian cell including an expression vector of claim 21.

23. The cell of claim 22, wherein said cell is a human cell.

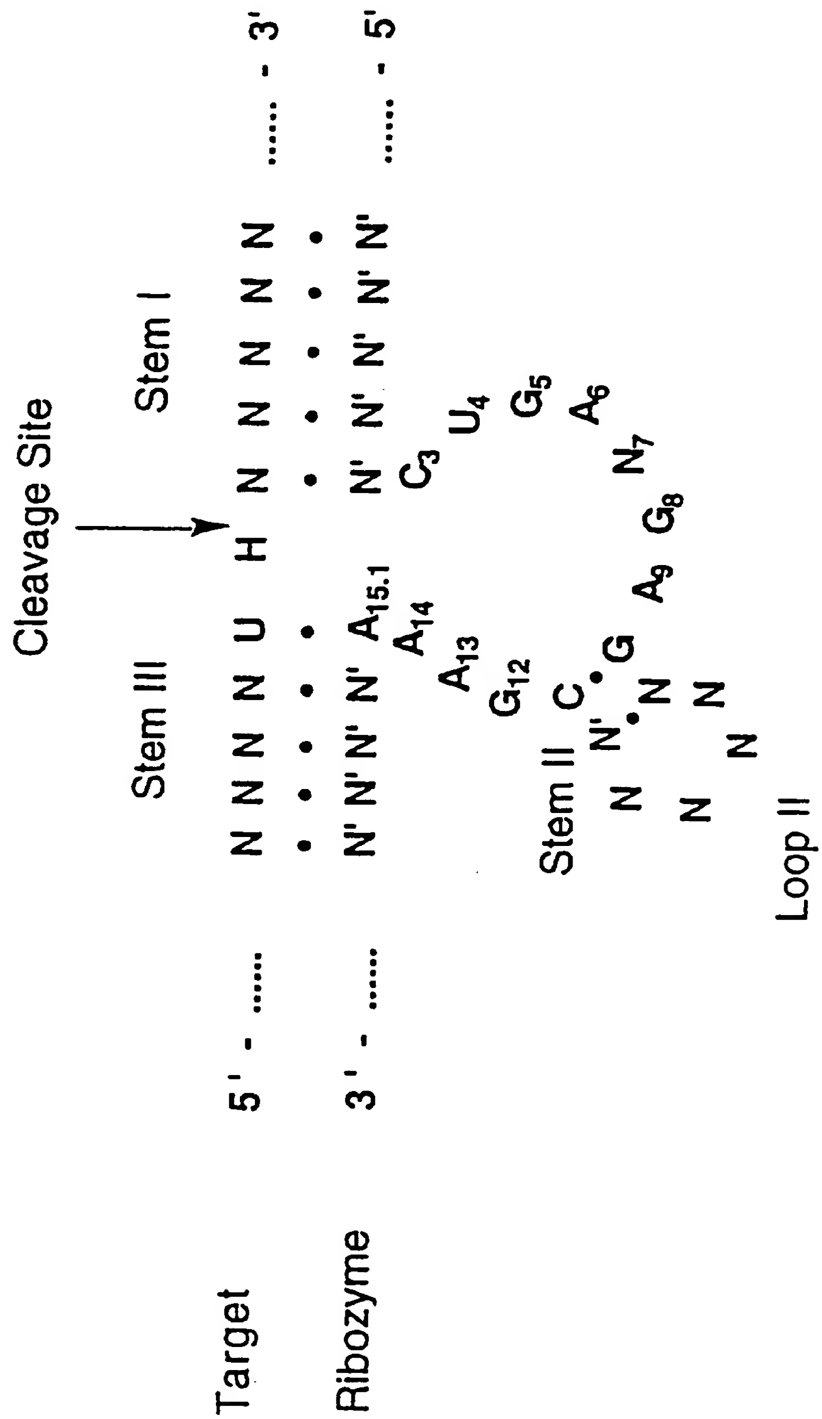

Cleavage Site
Stem I
Stem III
Stem II
Loop II
Target
Ribozyme
5' - ......
3' - ......
...... - 3'
...... - 5'

FIG. 1.

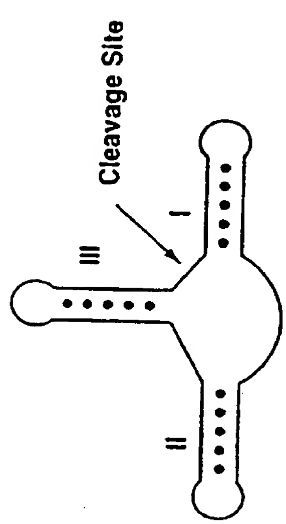


FIG. 2a.

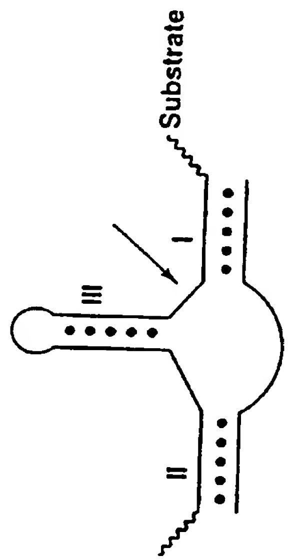


FIG. 2b.

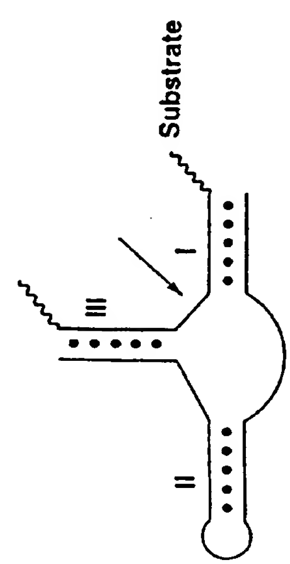


FIG. 2c.

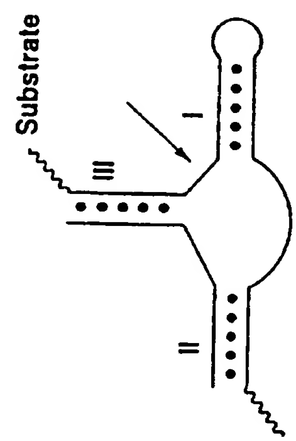


FIG. 2d.

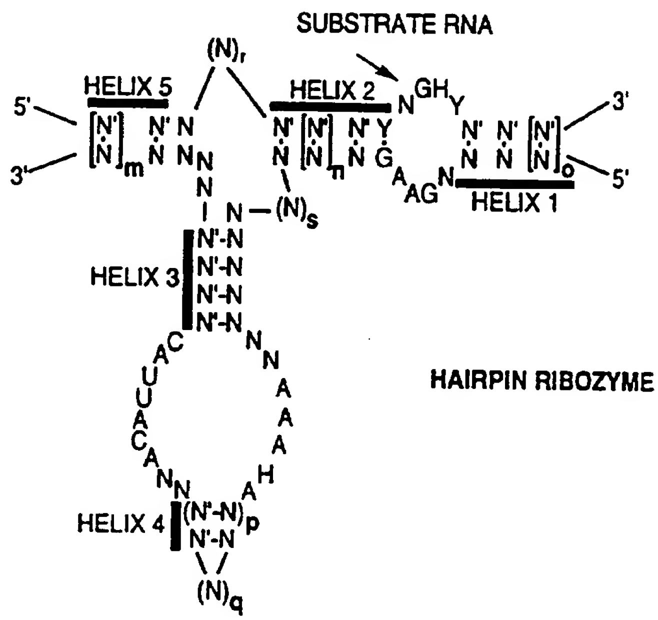

SUBSTRATE RNA
HELIX 5
HELIX 2
HELIX 1
HELIX 3
HELIX 4
5'
3'
(N)r
(N)s
(N)q
HAIRPIN RIBOZYME

FIG. 3.

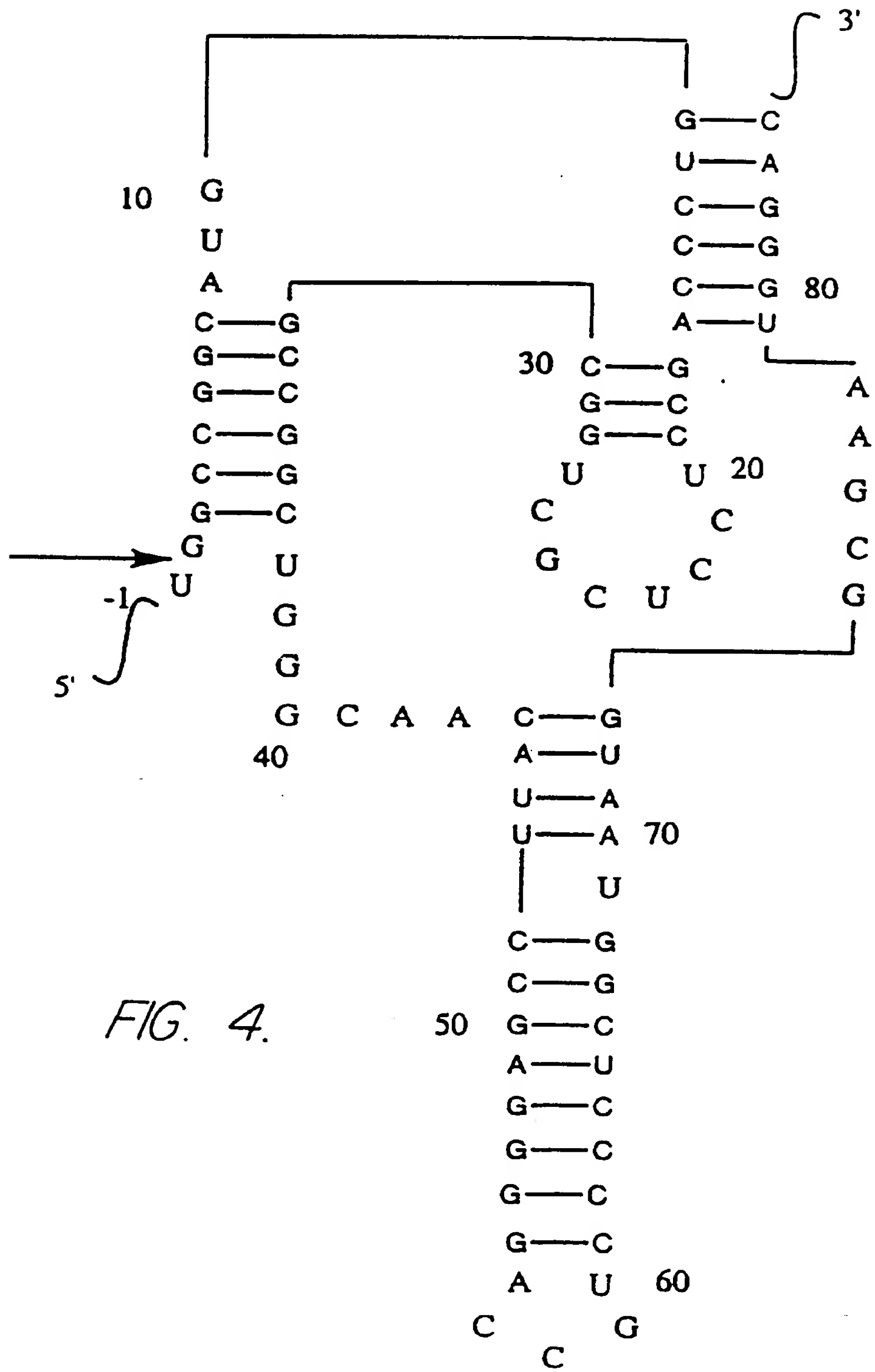

3'
10
G
U
A
C—G
G—C
G—C
C—G
C—G
G—C
G
U
-1
5'
U
G
G
G C A A
40
30
C—G
G—C
G—C
U
U
20
C
C
G
C
C U
G—C
U—A
C—G
C—G
C—G 80
A—U
A
A
G
C
G
C—G
A—U
U—A
U—A 70
U
C—G
C—G
50
G—C
A—U
G—C
G—C
G—C
G—C
A U 60
C G
C

FIG. 4.

NEUROSPORA VS RNA ENZYME

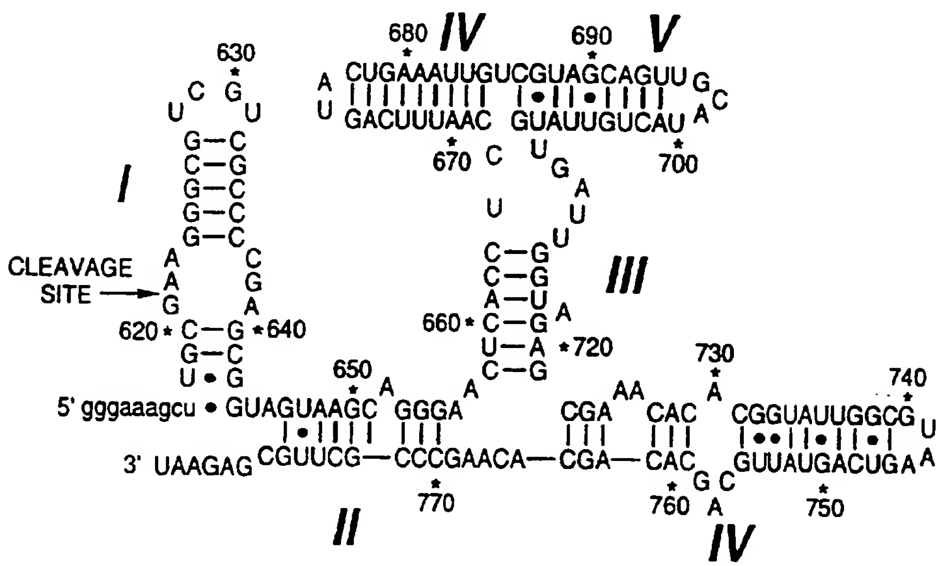


FIG. 5.

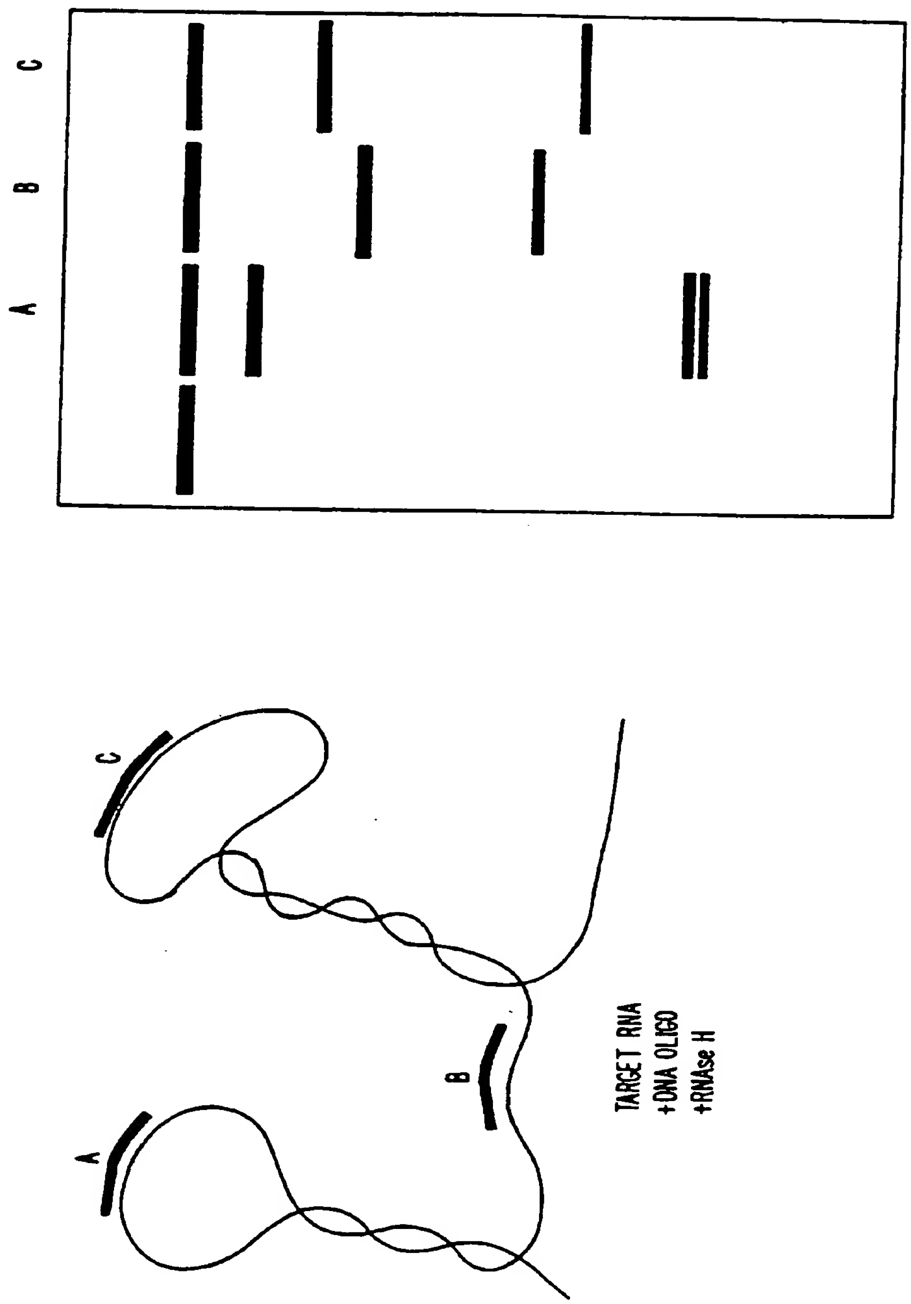
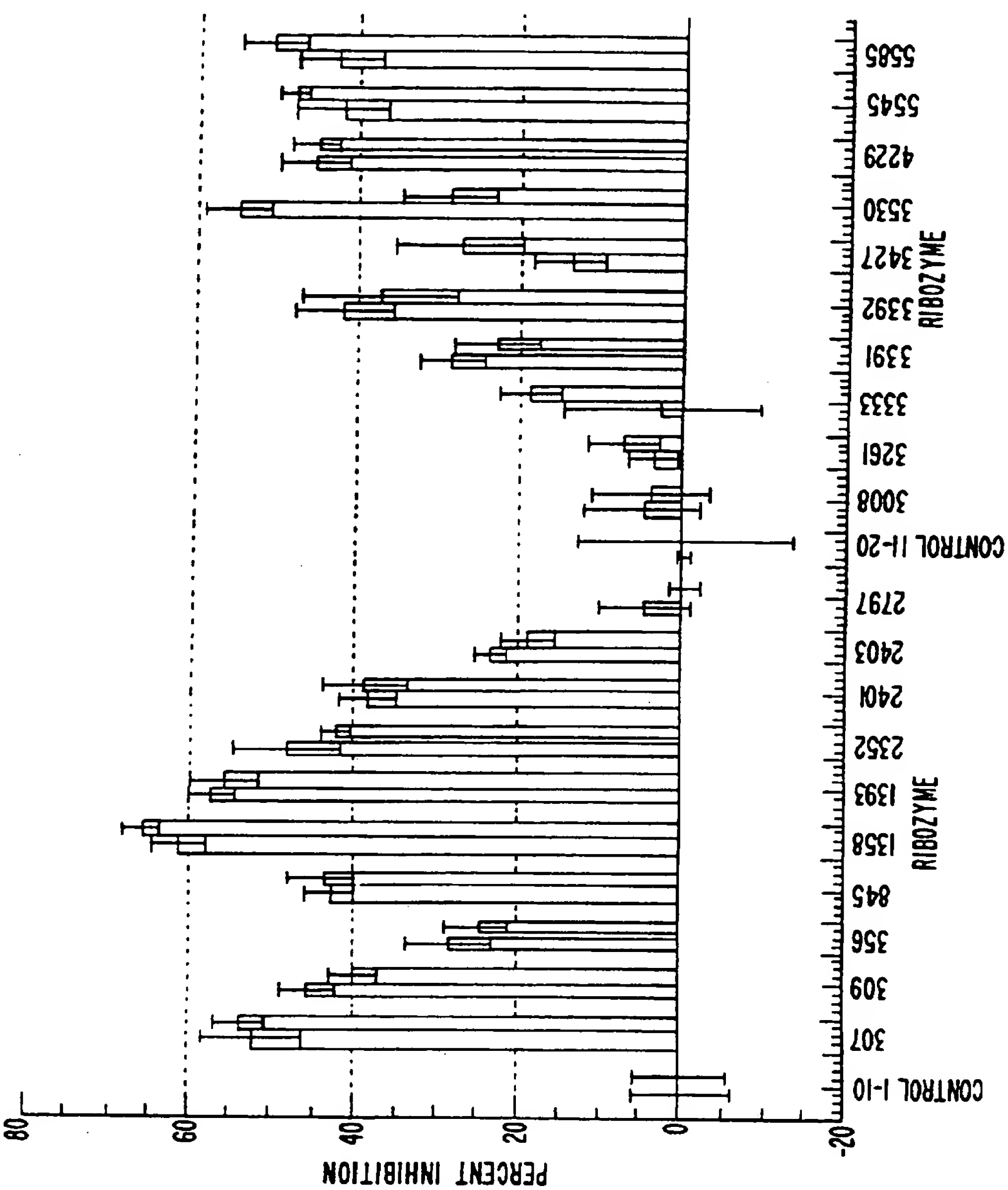


FIG. 6.

FIG. 7.


PERCENT INHIBITION
80
60
40
20
0
-20
RIBOZYME
CONTROL I-10
307
309
356
845
1358
1393
2352
2401
2403
2797
CONTROL II-20
3008
3261
3333
3391
3392
3427
3530
4229
5545
5585

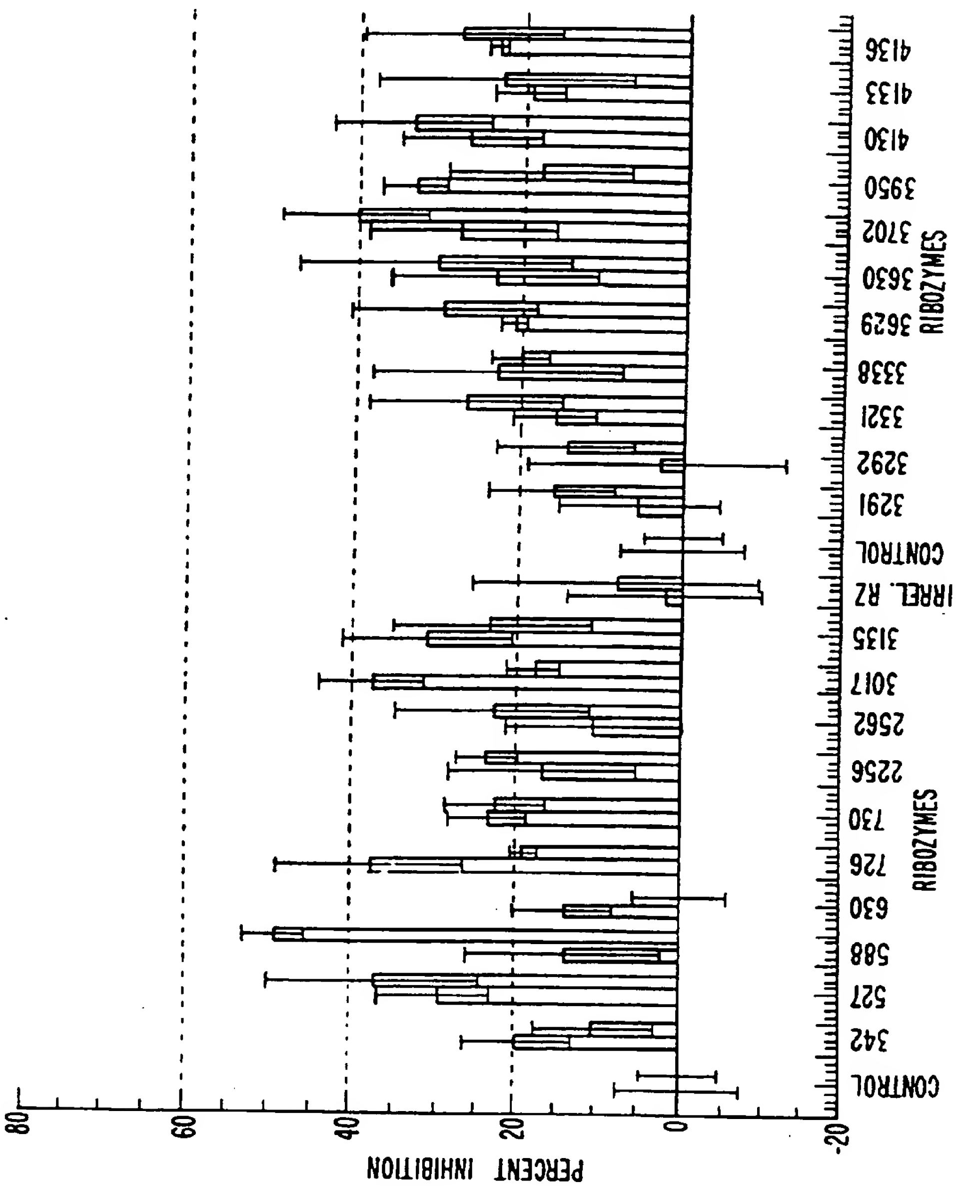
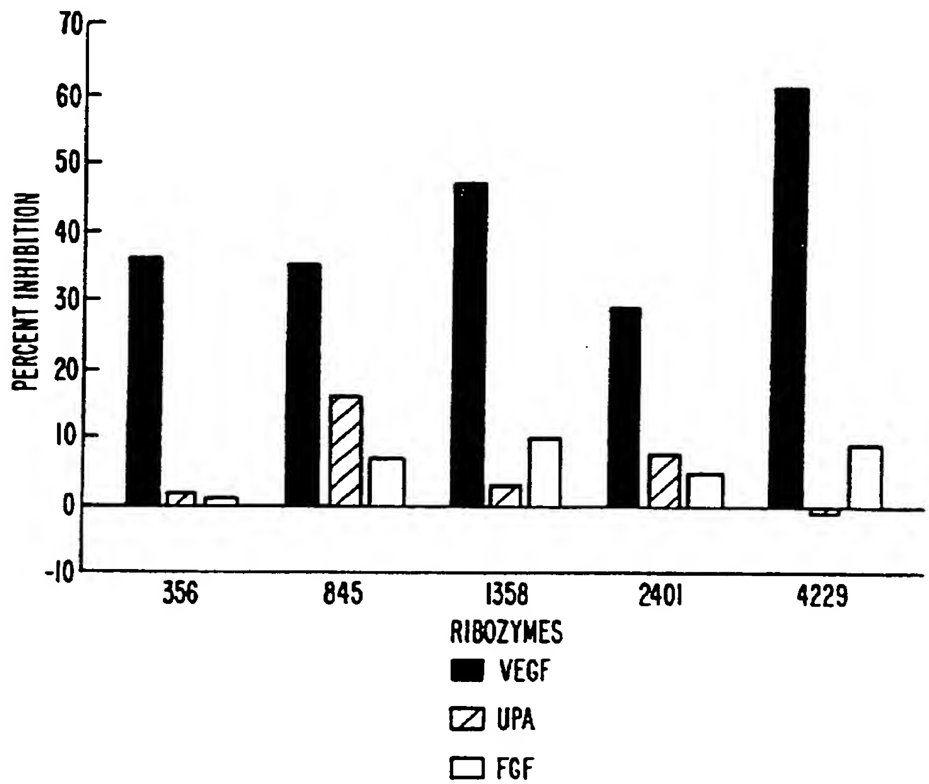

PERCENT INHIBITION
80
60
40
20
0
-20
CONTROL
342
527
588
630
726
730
2256
2562
3017
3135
IRREL. RZ
CONTROL
3291
3292
3321
3338
3629
3630
3702
3950
4130
4133
4136
RIBOZYMES
RIBOZYMES

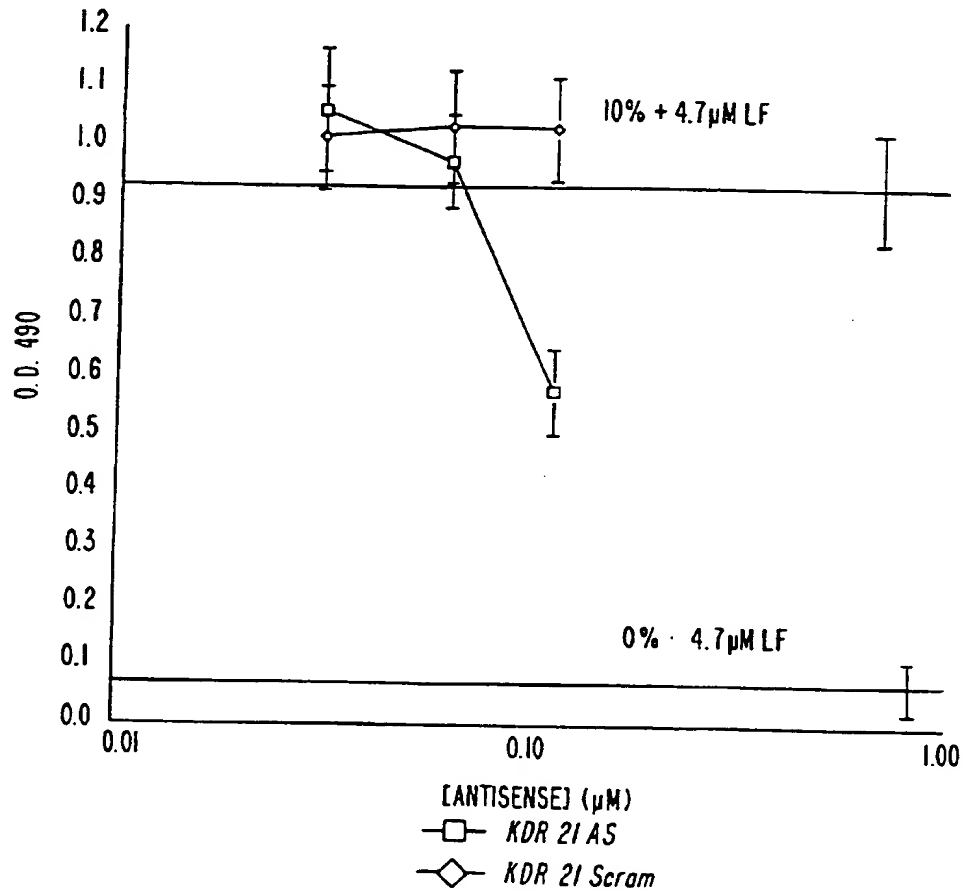
FIG. 8

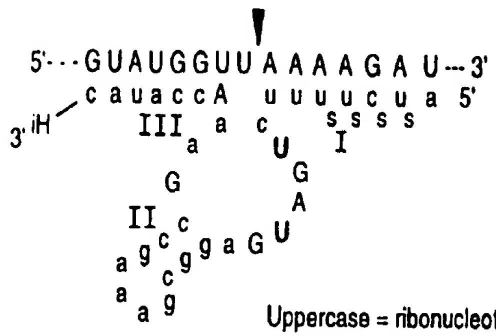


70
60
50
40
30
20
10
0
-10
PERCENT INHIBITION
356
845
1358
2401
4229
RIBOZYMES
VEGF
UPA
FGF

FIG. 9.

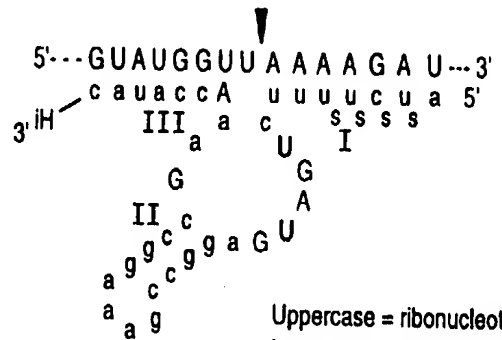
FIG. 10.


1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
O.D. 490
10% + 4.7μM LF
0% · 4.7μM LF
0.01
0.10
1.00
[ANTISENSE] (μM)
KDR 21 AS
KDR 21 Scram



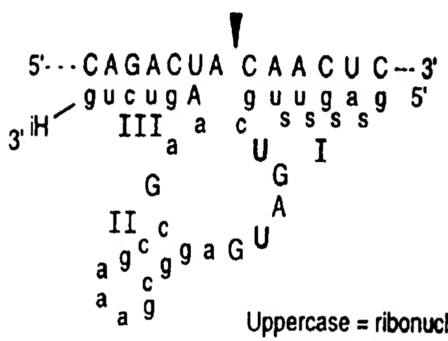
Uppercase = ribonucleotides
Lower case = 2'-*O*-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages

1358 HH-A Ribozyme



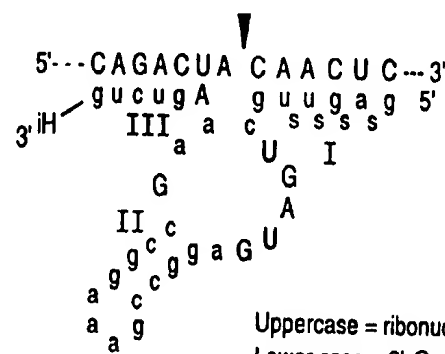
Uppercase = ribonucleotides
Lower case = 2'-*O*-methyl nucleotide
U = 2'-amino
s = phosphorothioate linkages

1358 HH-B Ribozyme



Uppercase = ribonucleotides
Lower case = 2'-*O*-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages

4229 HH-A Ribozyme



Uppercase = ribonucleotides
Lower case = 2'-*O*-methyl nucleotide
U = 2'-amino
s = phosphorothioate linkages

4229 HH-B Ribozyme

FIG. 11A.

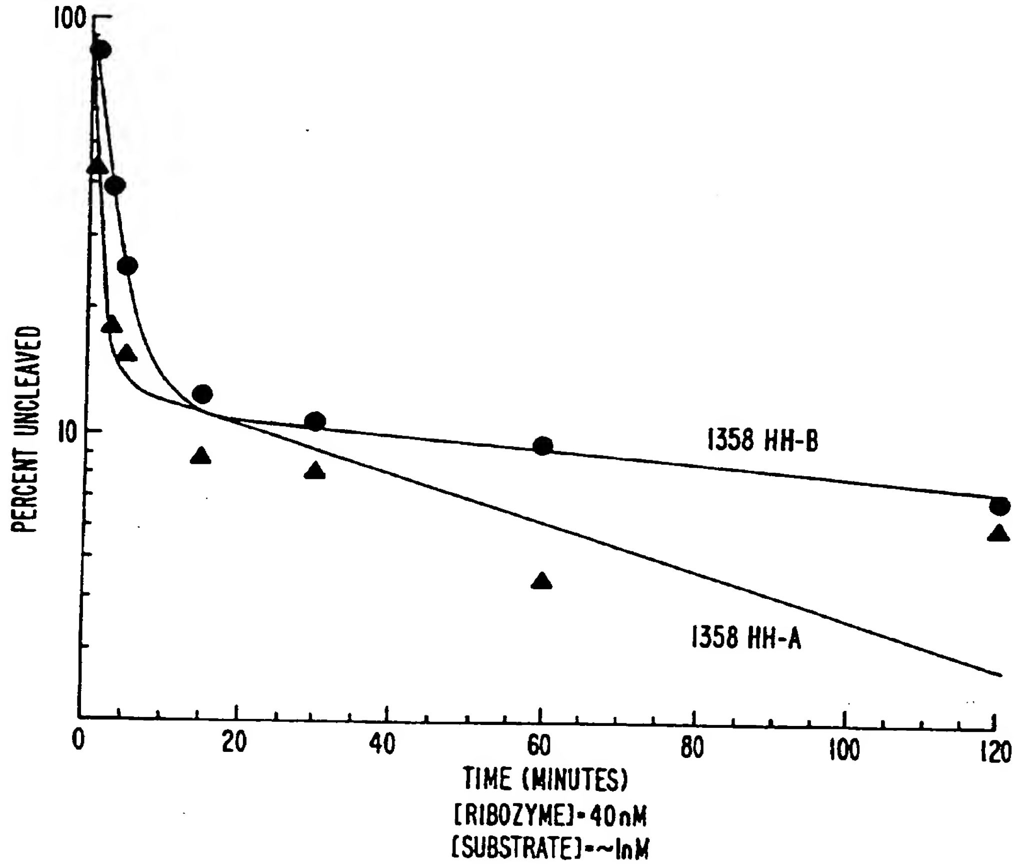
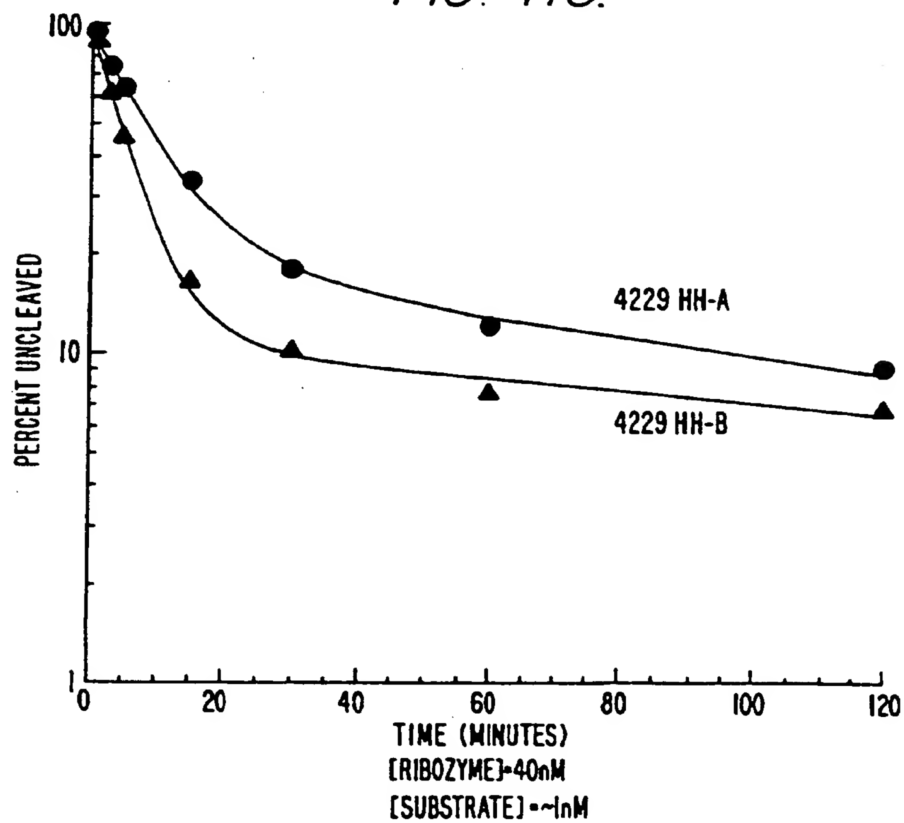

100
10
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME (MINUTES)
[RIBOZYME]=40nM
[SUBSTRATE]=~1nM
1358 HH-B
1358 HH-A

FIG. 11B.

FIG. 11C.


100
10
1
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME (MINUTES)
[RIBOZYME]=40nM
[SUBSTRATE]=~1nM
4229 HH-A
4229 HH-B

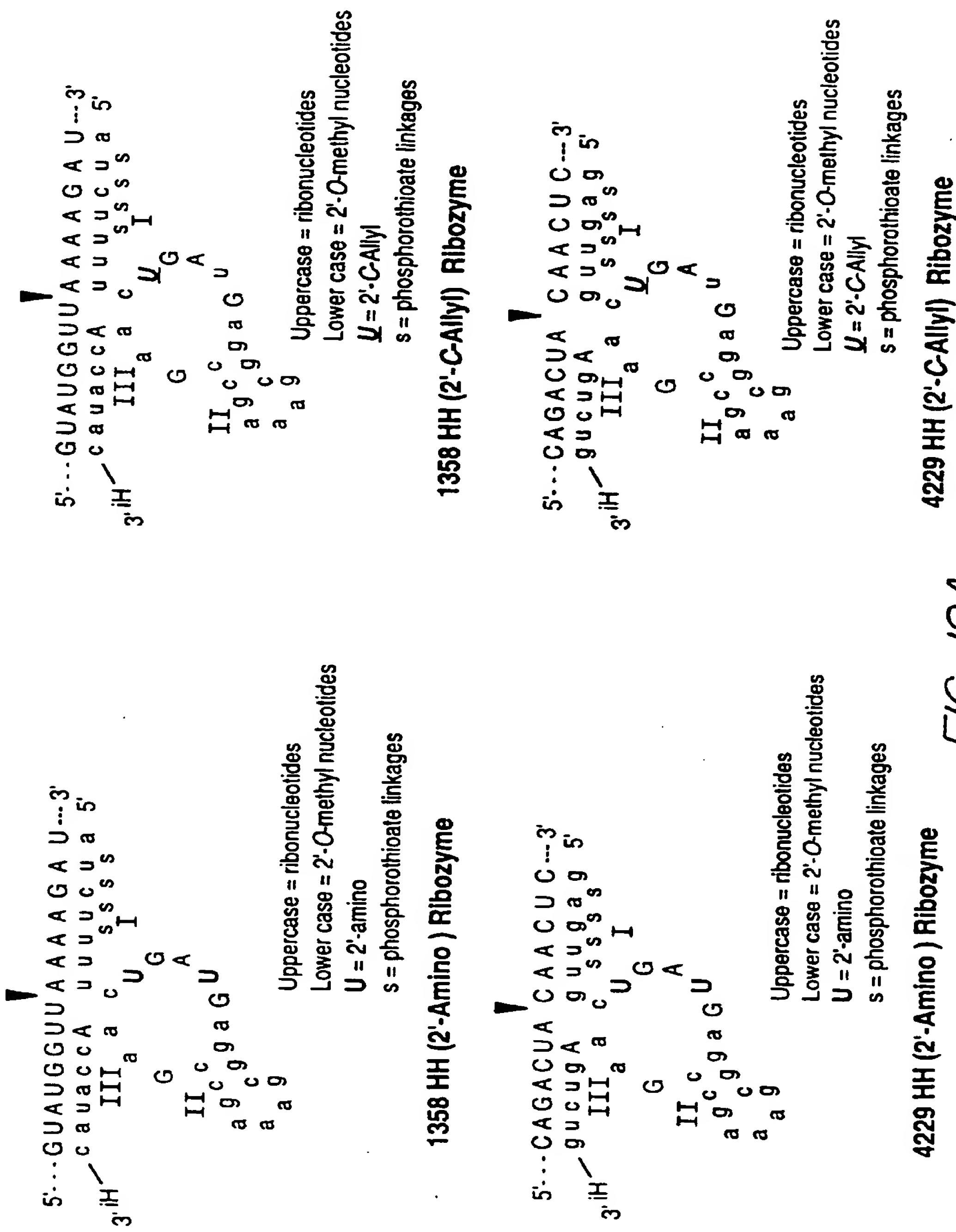

5'...GUAUGGUUAAAAGAU...3'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages
1358 HH (2'-Amino) Ribozyme
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-C-Allyl
s = phosphorothioate linkages
1358 HH (2'-C-Allyl) Ribozyme
5'...CAGACUACAACUC...3'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages
4229 HH (2'-Amino) Ribozyme
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-C-Allyl
s = phosphorothioate linkages
4229 HH (2'-C-Allyl) Ribozyme

FIG. 12A.

FIG. 12B.

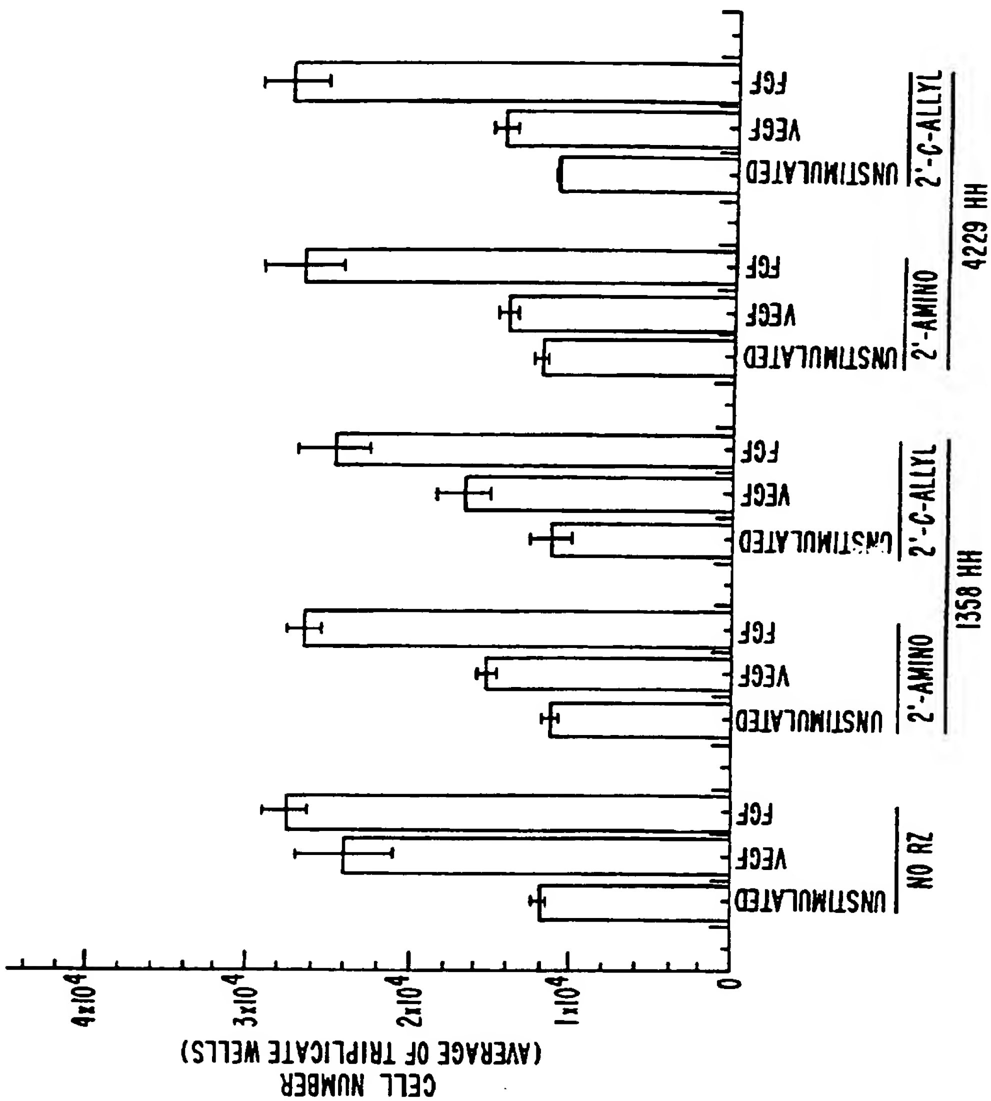

CELL NUMBER
(AVERAGE OF TRIPLICATE WELLS)
4x10^4
3x10^4
2x10^4
1x10^4
0
UNSTIMULATED
VEGF
FGF
NO RZ
2'-AMINO
2'-C-ALLYL
1358 HH
4229 HH

FIG. 13.

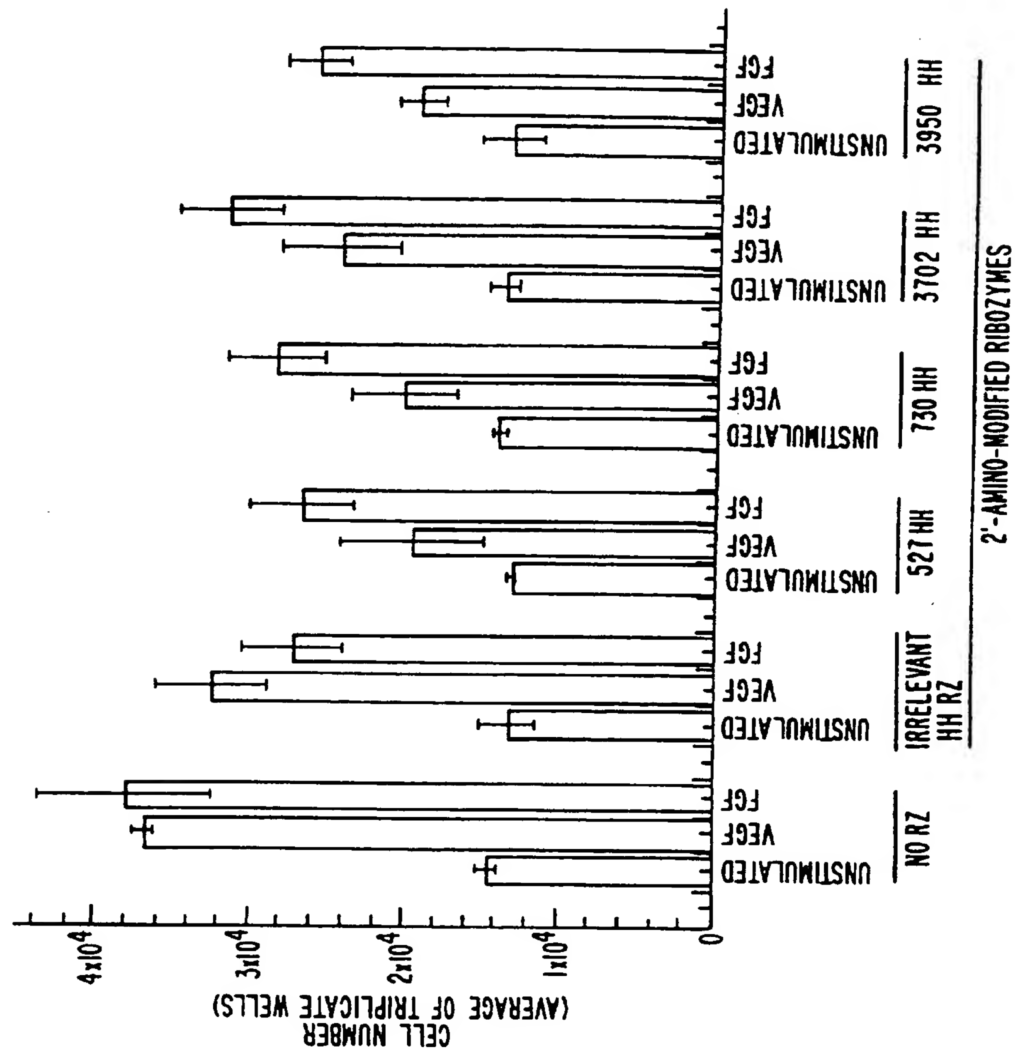

CELL NUMBER
(AVERAGE OF TRIPLICATE WELLS)
4x10^4
3x10^4
2x10^4
1x10^4
0
UNSTIMULATED
VEGF
FGF
NO RZ
IRRELEVANT HH RZ
527 HH
730 HH
3702 HH
3950 HH
2'-AMINO-MODIFIED RIBOZYMES

FIG. 14.

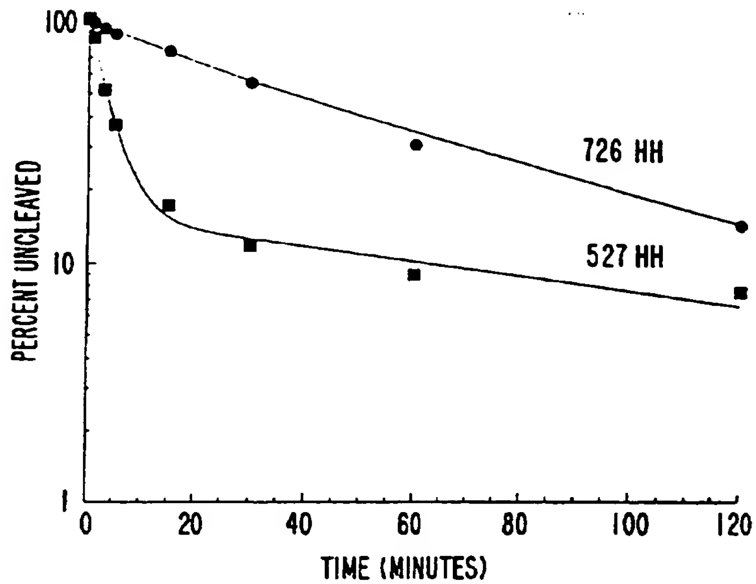

100
10
1
PERCENT UNCLEAVED
726 HH
527 HH
0
20
40
60
80
100
120
TIME (MINUTES)

FIG. 15.

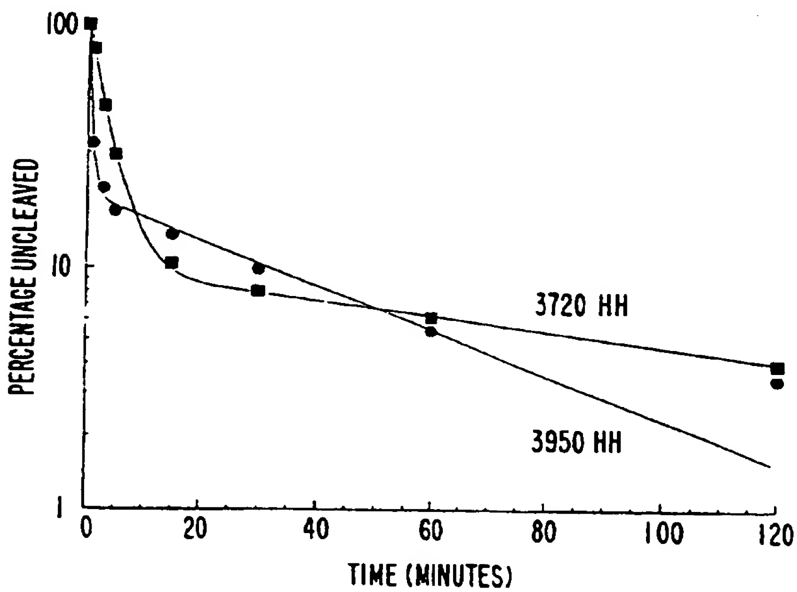

100
10
1
PERCENTAGE UNCLEAVED
3720 HH
3950 HH
0
20
40
60
80
100
120
TIME (MINUTES)

FIG. 16.

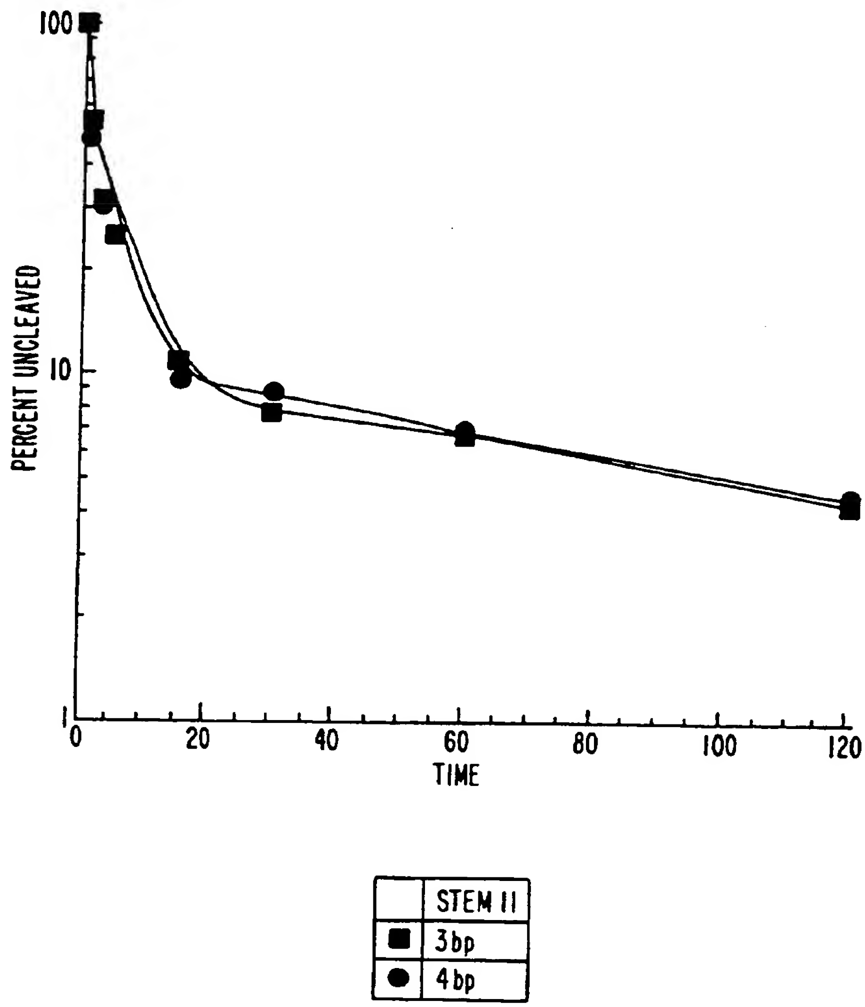

100
10
1
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME
STEM II
3bp
4bp

FIG. 17.

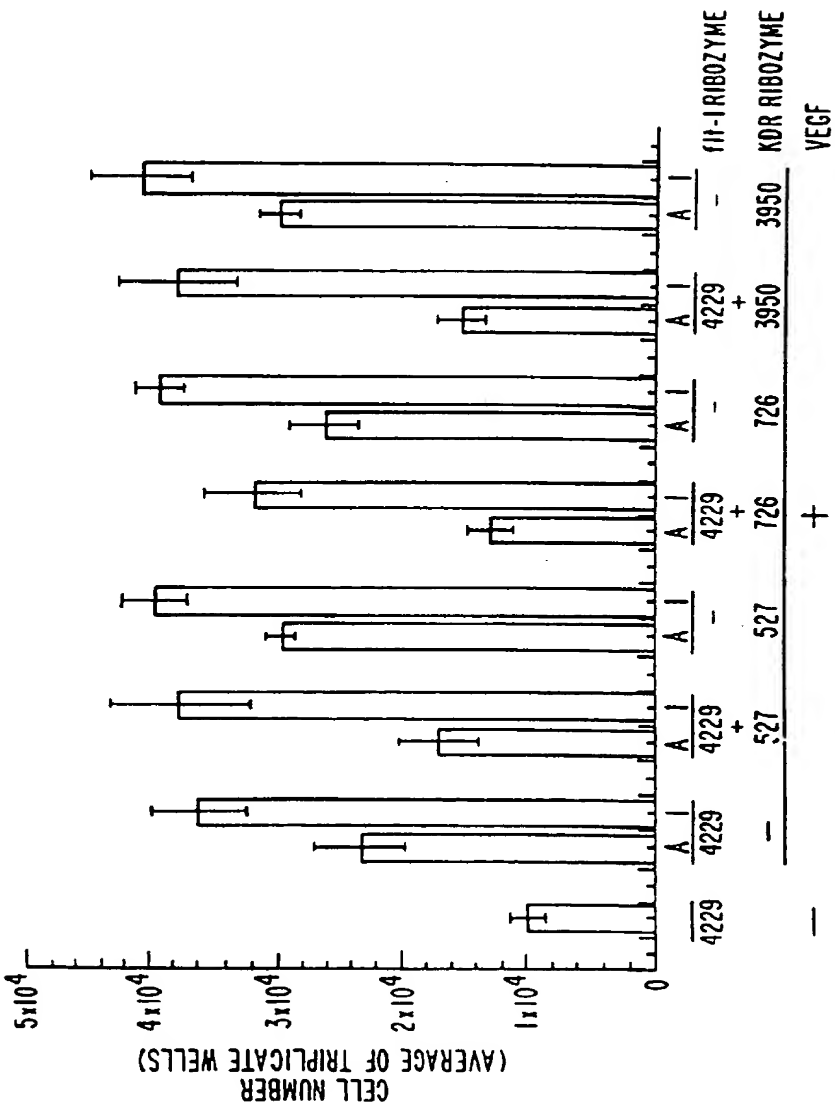
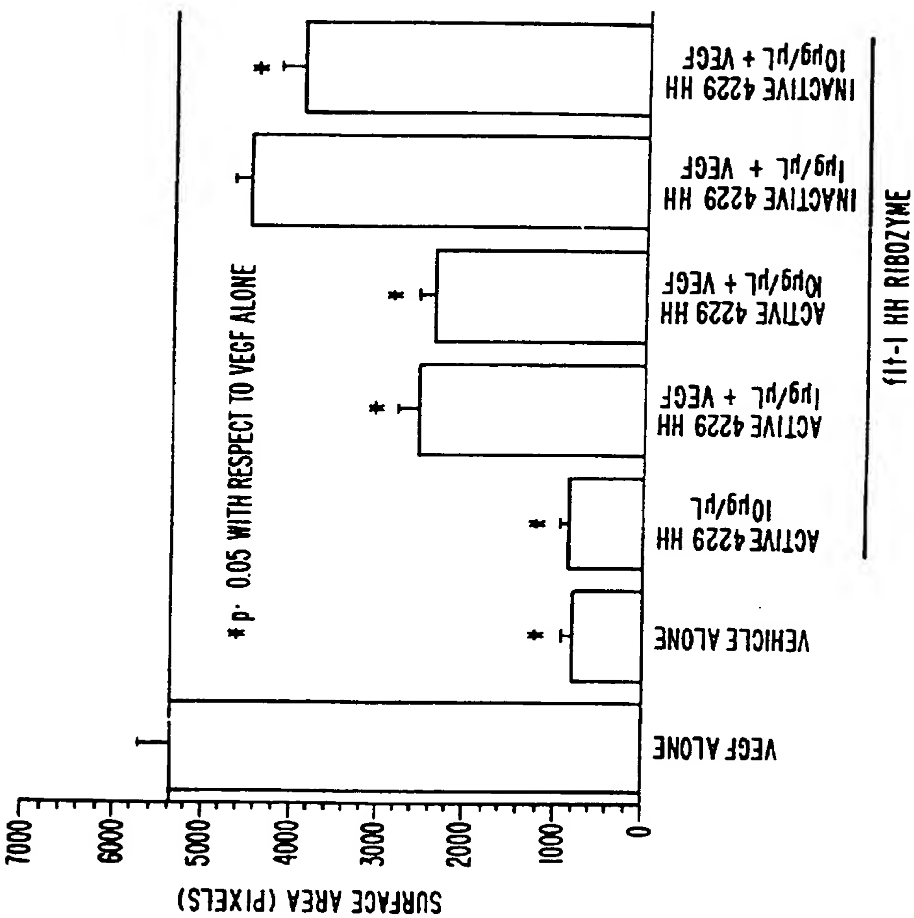

CELL NUMBER
(AVERAGE OF TRIPLICATE WELLS)
5x10^4
4x10^4
3x10^4
2x10^4
1x10^4
0
A I
4229
527
726
3950
flt-1 RIBOZYME
KDR RIBOZYME
VEGF
+
-

FIG. 18


SURFACE AREA (PIXELS)
0
1000
2000
3000
4000
5000
6000
7000
* p· 0.05 WITH RESPECT TO VEGF ALONE
VEGF ALONE
VEHICLE ALONE
ACTIVE 4229 HH 10µg/µL
ACTIVE 4229 HH 1µg/µL + VEGF
ACTIVE 4229 HH 10µg/µL + VEGF
INACTIVE 4229 HH 1µg/µL + VEGF
INACTIVE 4229 HH 10µg/µL + VEGF
flt-1 HH RIBOZYME